*February 1973*

# Smithsonian

Dilemma: need for energy vs. strip mining (p. 18)
Above: 13,700,000-pound giant earth mover (GEM)

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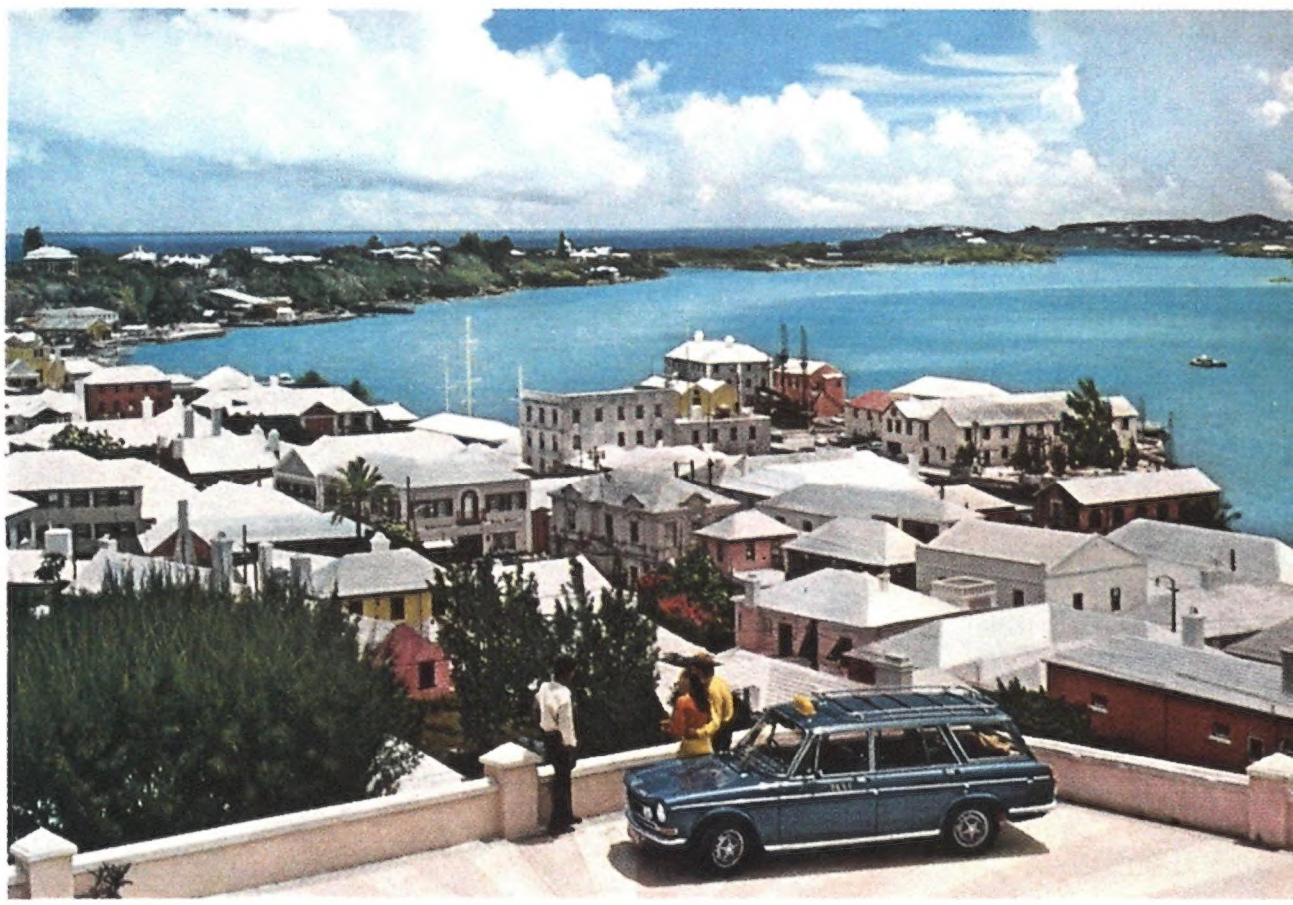

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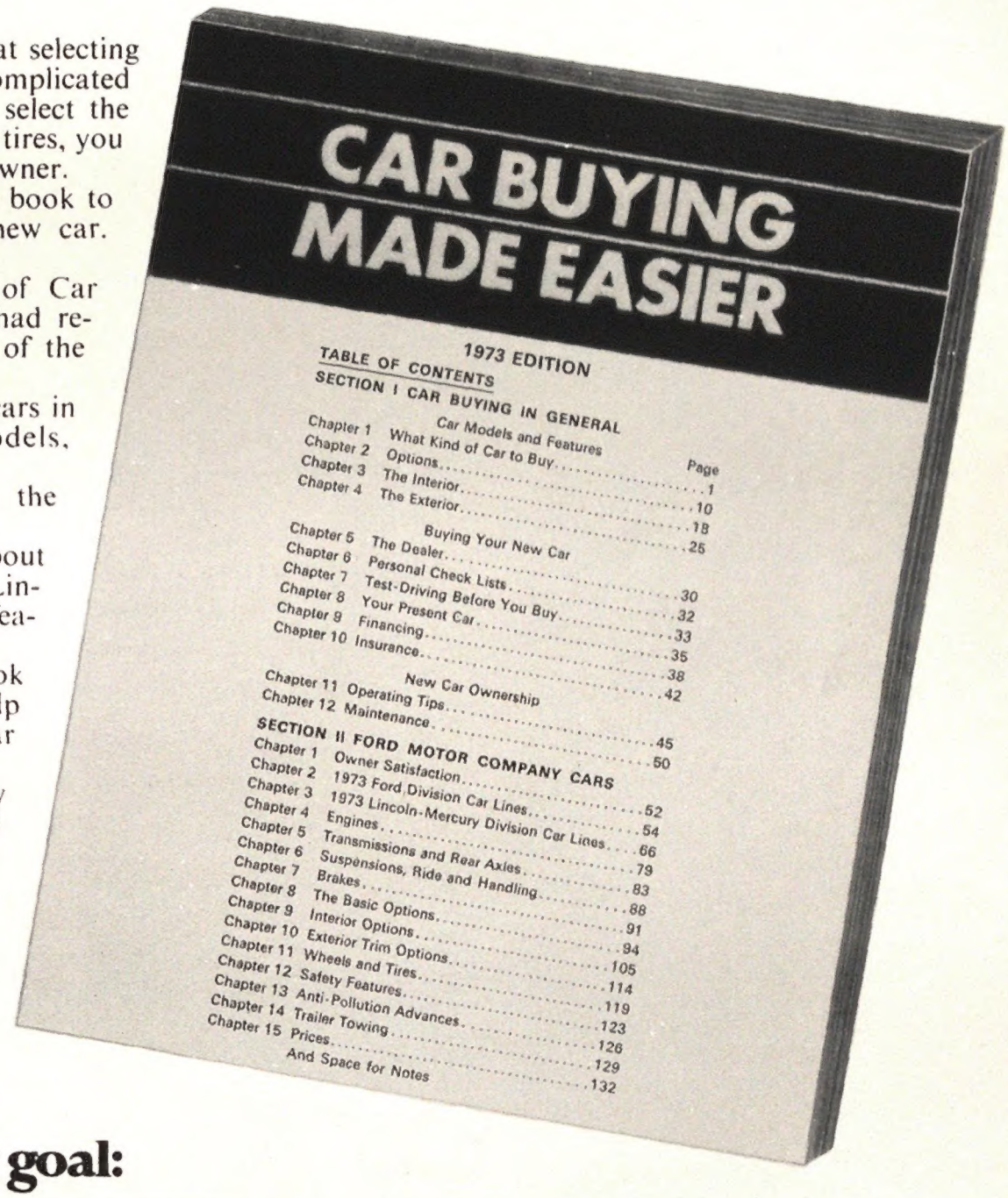
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*February 1973*

# Smithsonian

Volume 3, Number 11

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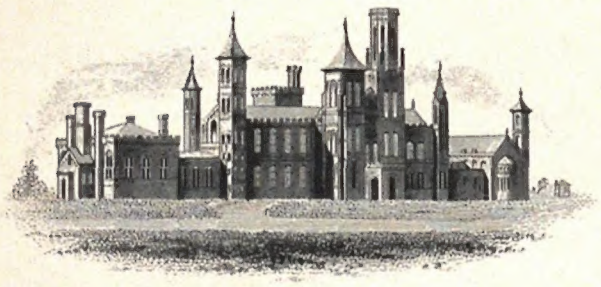
*Secretary Ripley's comments*

# *The view from the castle*



*For a scientist who turned administrator salvation lies in continuing work in his laboratory, and memories of damp nights*

Recently I wrote of people trained as scientists who, like myself, find themselves drawn into the world of public administration, arenas far removed from a career in research. What is it like to give up one's training and fill one's days with the busyness of administration? Shakespeare speaks of a "scholar" who was "sweet as summer" to those who communed with him but "lofty and sour to them that lov'd him not." If most scientists who have become administrators turn "lofty and sour" it may be because they are inwardly thwarted.

When I came to work at the Smithsonian from a university I did so with the knowledge that all of my predecessors had been scientists and each had continued research while Secretary. I am still convinced that a scientist-administrator can work best if he has time to continue to delve into his specialty, to read journals, to think of research problems and to continue to publish.

For my own part I flee to a laboratory in the Museum of Natural History where my books and my collections of bird specimens are housed. To close the laboratory door behind me is to reawaken a whole continuing chapter of my life as an ornithologist. In recent years I have been working with a Philippine friend, Professor Dioscuro S. Rabor, on bird populations and the distribution of species on the southern islands of that archipelago. However, that work has been laid aside for lack of time until I can finish a ten-volume handbook on the birds of the Indian subcontinent, on which I have been working since the end of World War II—the past years with Dr. Sálim Ali, the dean of ornithology in India. This is a complicated encyclopedic task: The end result will incorporate many, many years of plodding field work, many years of systematically measuring bird skins, and of collating field notes and observations, ours and those of others.

Then there are other projects. I am currently writing a number of introductory chapters to a monograph on the rails, a worldwide family of marsh birds.

Many rails are enigmas. The total lack of recent information about an elusive, skulking species of the Solomon Islands turns me inside out with curiosity. How to drop everything and go to the Solomons and find out?

In recent years I have been fortunate enough to encounter some of the rare marsh birds of New Guinea. It is a personal thrill to look back and relive damp nights on a mountain ridge in the heavy forest of west New Guinea, and rediscover for myself a rare bird. Ensconced in my laboratory, I can jot it all down again, feel the damp eat into my bones, remind myself what it's like to have malaria, remember how I starved for ten days.

Other projects are shorter-term. Sálim Ali and I are working on a list of birds of the mountain kingdom of Bhutan, which we have visited three times. Next fall I hope to make another short trip there to watch the autumn migration over the Himalayas. In my laboratory my toes curl with anticipation.

And so when I put out the lights late in the evening, close the door and go home, I feel smoothed out, content. This is my way to stay "sweet as summer."

S. Dillon Ripley

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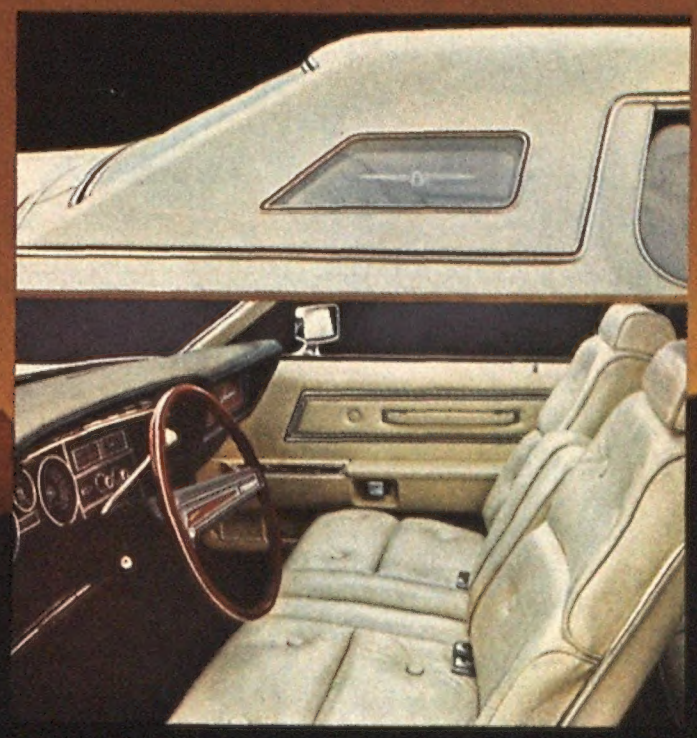

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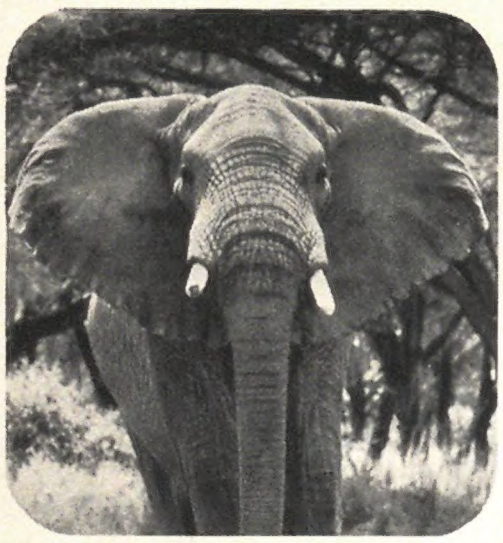

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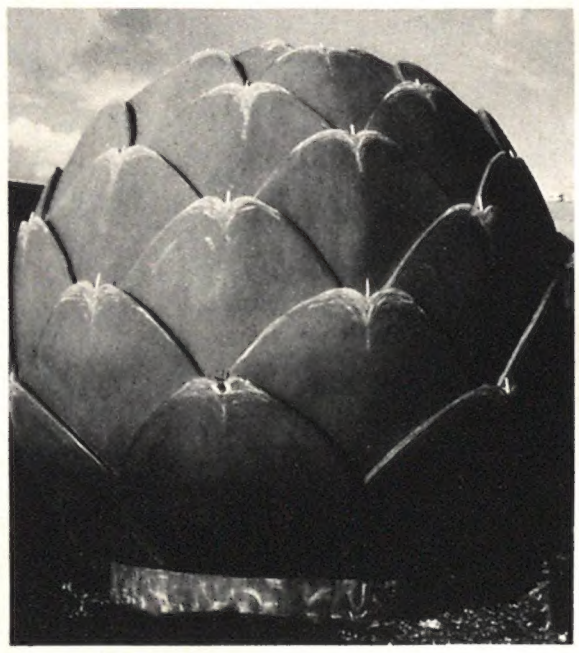
# *Phenomena, comments and notes*

*The best fish lure, machines and men, statistics and women, no comfort for the obese and an artichoke discovery*

There is heady news for the citizens of Castro, California. For those unaware of Castro, it is a small agricultural town that celebrates its preeminence as the artichoke capital of the world by lining its few boulevards with huge plastic replicas of *Cynara scolymus* (see photograph).

A popular delicacy once rumored to be an aphrodisiac, the artichoke may well become even more popular now, thanks to a property considered unique among commonly consumed American food plants. It alters the sense of taste—at least temporarily. The artichoke's taste-altering capacity was first suspected in 1934 when American Association for the Advancement of Science biologists were having dinner after a scientific meeting. After

The pride of Castro: a plastic artichoke



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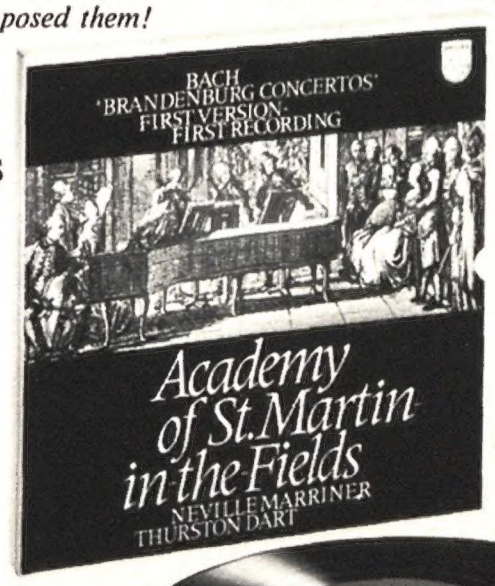

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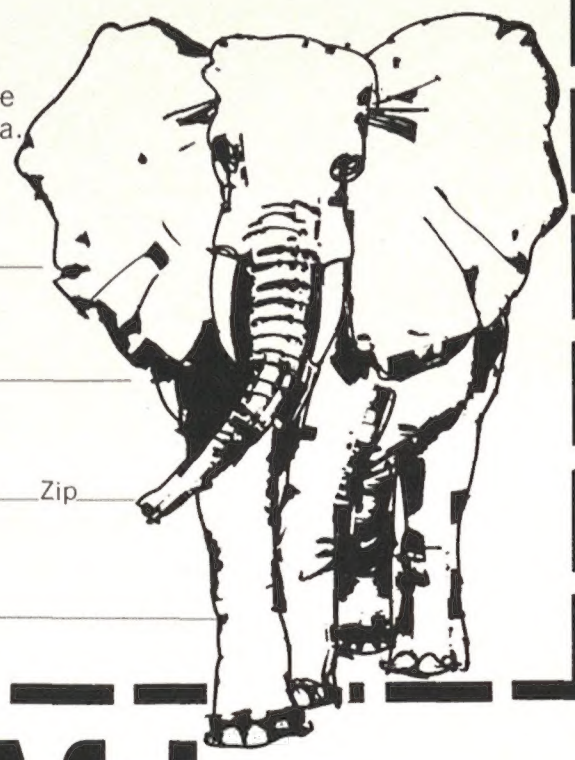

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the salad course of artichokes, 60 percent of the nearly 250 diners said their water tasted different—in most cases sweeter. (One wonders if biologists always keep such statistical track of their banquets.)

Now all this has been confirmed by a New Haven public health researcher and two scientists employed by General Foods. Writing in *Science,* they say that "exposure of the tongue to the extract from one-fourth of an artichoke heart . . . makes water taste as sweet as two teaspoons of sucrose in six ounces of water."

The scientists have gone on to identify the active ingredients involved, two acids (chlorogenic acid and cynarin) and their isomers, which can presumably be created artificially. Until General Foods or some other concern begins large-scale synthetic production, however, Castro's preeminence may reach new heights in a world where just about everybody's polluted, recycled, chlorinated and purified drinking water tastes so awful.

*Predictably unpredictable crowds*

For reasons which were left murky in their report to *Nature,* two Australian mechanical engineers have been applying to human crowds the statistical methods by which one might predict the behavior of molecules in a gas. Specifically, they have been analyzing how crowds walk—university students, children in a play-

People in crowds: not quite molecules

ground and pedestrians on a crosswalk.

Their early efforts indicated that the humans moved right along nicely in harmony with the statistical predictions—except for one deviation they noted. Men and women, though evenly distributed, behave like two separate populations.

In their next round of tests, the engineers not only confirmed this difference but in addition found that the women showed statistically exasperating differences among themselves.

However, before female readers grow smug about being independent spirits compared with the sheeplike pedestrian men, it should be noted that the engineers found a less-exalted reason for the distinction: motor vehicles. Men, they reason, are inclined to ignore the traffic or even speed up as a group when challenged at an intersection by an oncoming motor vehicle. Women, on the other hand, seem inclined to lose the pace out of timidity (call it good sense). And as for the individual differences among women pedestrians, it would seem that elderly women are more alarmed than younger ones by the sight of an onrushing car.

Whatever the reason for these studies, they will no doubt prove valuable to the Boy Scouts and the old ladies they help for their daily good turn.

*Predictable fish*

While it is rather nice to know that elderly women are a bit unpredictable, it is also nice to hear that migratory fish, such as salmon and trout, aren't.

The odor of the home stream has long been suspected to be the main guide for a salmon returning to spawn. If that is true, reasoned Dale M. Madison of the University of Wisconsin at Madison, it should be possible to raise fish in a hatchery and imprint them artificially with some chemical odor. Then, by releasing the chemical into the water, one could steer the fish into some convenient location or back to the hatchery.

And this is precisely what Dr. Madison of Madison did. Thousands of tagged fish, half of them chemically imprinted and half not, were released into Lake Michigan. Near the mouth of a stream containing the right chemical, the imprinted fish stopped short and milled around while the control fish swam by without interest. If the chemical were removed from the stream, both groups swam by


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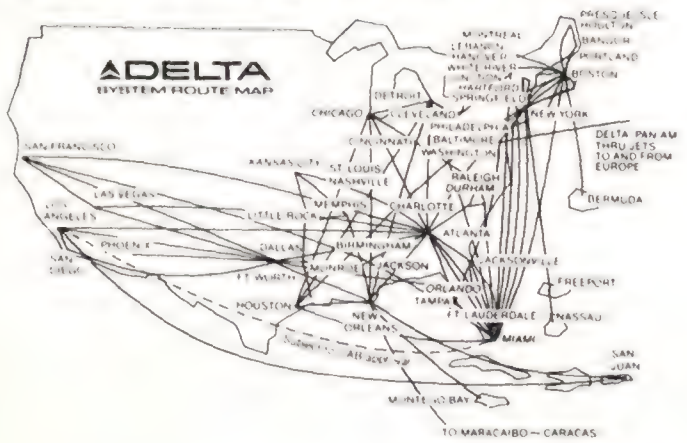

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without stopping. The implications of this research for commercial fishing are obvious, but one hopes the day does not arrive when sports fishermen replace those clear plastic boxes filled with beautiful, tediously tied flies for the unesthetic convenience of a chemistry set.

*Man vs. machine*

Last December, a distinguished sociologist from Columbia University, Dr. Daniel Bell, gave a lecture at the Smithsonian's Museum of History and Technology. His message was that technology is a tool for society, and society consists of men and women: Therefore Man is still, in spite of appearances to the contrary, in charge of technology.

This cheerful message came on the heels of a report from the National Academy of Sciences (NAS) on the question of computers and the invasion of privacy. The report holds that things never really were so good. They may be even better now, thanks to the fact that most organizations with computerized information about you are inclined to take greater security precautions against casual theft and sabotage. Man, concludes NAS in ringing tones, is still in charge of machines.

This news will be a relief to those who have spent 12 months off and on trying to straighten out a bill from a department store or to track down a missing 39 cents in a bank account, or who have driven for miles to find someone who can repair a carburetor or tried riding a bicycle to work on a freeway. Indeed, Man may well still run the machines but the question is: Which man?

*A test for obesity*

Why do fat people overeat? The common answer is to relieve anxiety and fear. Two psychologists, Edward E. Abramson of California State University at Chico and Richard A. Wunderlich of Catholic University of America, sought an objective test of the commonly agreed upon, if unhelpful, principle. Students—some fat, some not—were invited to participate in a cracker-tasting test. Some of the volunteers were told that if their sense of taste were poorly attuned, they were very likely to be failures also in all of life's other challenges. Another group was told that they would be given shocks to test the relationship between stimulation and taste

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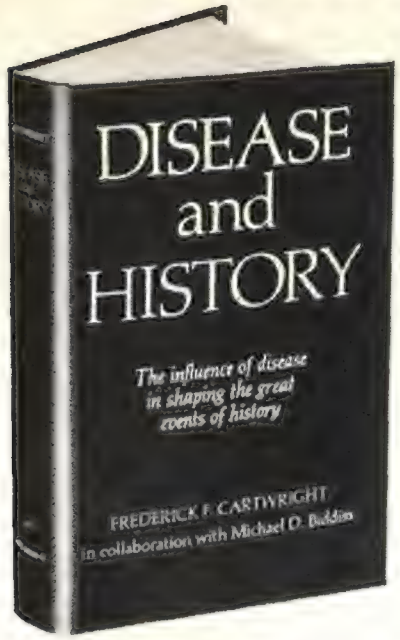
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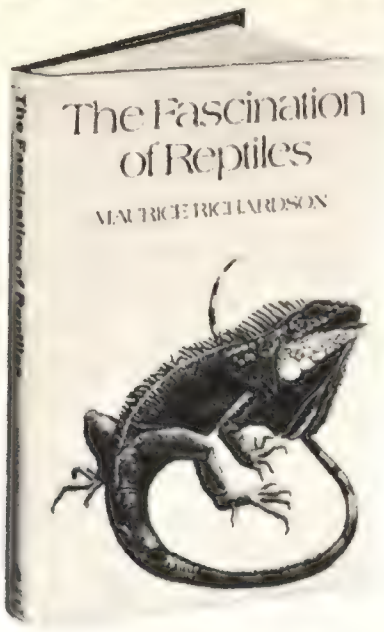


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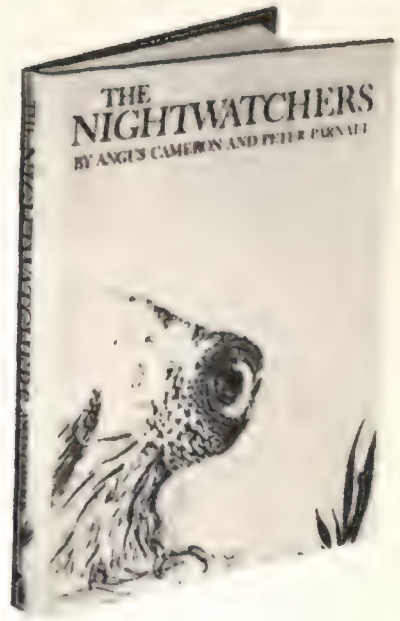


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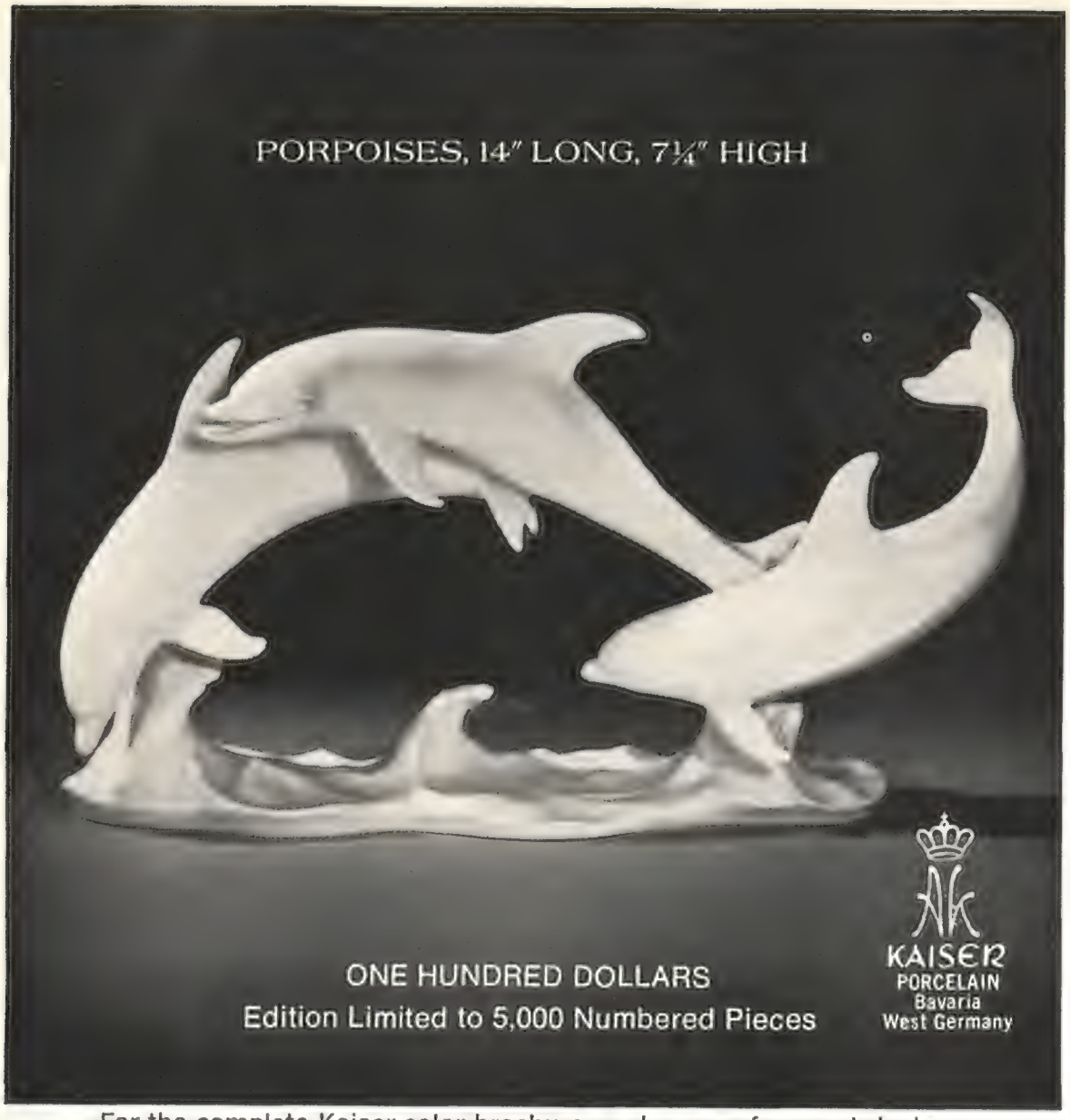


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discrimination. A third group was left free of anxiety-producing caveats.

As it turned out, the fat students ate no more crackers than the thin students, though the fatties did show greater anxiety over the psychologists' dire warnings. Does this mean that anxiety does not lead to overeating among the obese? *Human Behavior* magazine, commenting on this research, rightly questions whether an offering of crackers is the same thing as, say, lemon cream pie.

*Fragments*

Readers who have become attracted to catastrophe reports from the Center for Short-lived Phenomena which sometimes appear in these pages, should reserve the night of Thursday, February 15.

On that night, over most CBS-affiliated stations, there will be a one-hour television special about the Center called *The Violent Earth*. The show will explore the working of the Center's Cambridge, Massachusetts, headquarters and follow a team of geologists descending into the crater of an active volcano in Zaïre. Though the show was produced under the auspices of another magazine, SMITHSONIAN recommends it.

As graffiti become more common (see pp. 62-71), they become a more common subject for professional inquiry. Architects and city planners are beginning to leave room for wall-writing in their designs; some art critics call graffiti "people's art" and then applaud or debunk according to their sensibilities. But what is one man's self-expression is another's defacement. What is needed, especially if scientists such as psychologists are to get into the act (which they have), is a good, neutral, objective term for graffiti—one that implies no prejudgment on the part of the scholar. And Dr. Robert Sommer, a California psychologist writing for architects in the *AIA Journal* has found it. Now we may think of the writing on the bathroom wall as "direct user involvement in environmental change."

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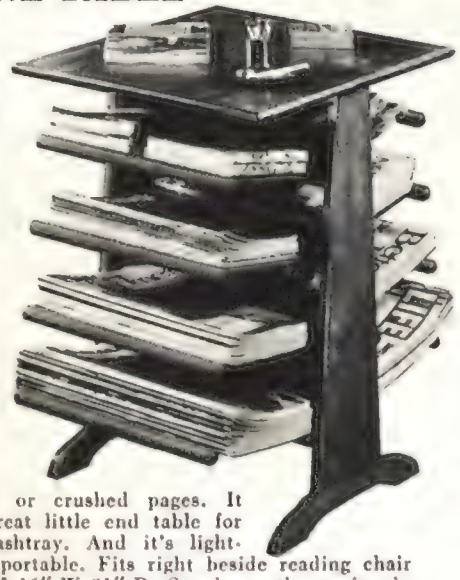

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# *Letters to the Editor*

## *Improving the land*

Dear Sir: I would like to add a footnote to René Dubos' wonderful article in the December 1972 issue on how Man helps improve nature.

Last May, my wife and I visited the monastery of Moni Kaisariani on the slopes of Mount Hymettus in Greece, mentioned by Dr. Dubos. While taking a walk on the road above the monastery, we came upon an extensive area planted with new trees, and soon saw a large sign saying that the International Wildlife Associates, in cooperation with local groups, is reforesting the slopes of Mount Hymettus. It would appear that at least some "arboriculturists" with a mission have arrived on the site.

On a later trip to the Peloponnesus, we were told by our guide that the many stands of cypress trees we saw were planted as dowries by parents of girl babies. By the time the girl reached marriage age, the trees could be harvested for dowry money, or even the start of a new house.

*Preston K. Mears*
Chatham, New Jersey

## *Plasma physics*

Dear Sir: My hat is off to SMITHSONIAN and, especially, to author Ben Bova for the magnificent exposition on how closely plasma physicists are approaching a means for unleashing unlimited, controlled energy without radiation pollutants. Equally exciting is the prospect that the energy of the fusion plasma can be used to vaporize any kind of material for recycling.

This article should make all mankind take heart. Let's get on with it! Impressive and important as our space explorations have been, let's put more money into fusion development and let Mars wait a while.

*Richard L. Lynch*
Morristown, New Jersey

## *Lafayette Escadrille*

Dear Sir: "The Escadrille's thrilling era" by J. Timberlake Gibson re-created the sense of daring of these young Americans who showed "a spectacular willingness to die for a cause."

It might interest you to know that the Vail Lovell mentioned in your article is alive and well in Sanford, Florida. He is busily engaged in health research and at work perfecting an ocular surgical magnet to attract nonmagnetic (nonferrous) conducting substances.

*Bruce V. English*
Ashland, Virginia

Dear Sir: The Lafayette Escadrille was, of course, in great part a propaganda operation. Nonetheless, the score of 39 kills is not contemptible for a bit over a year of flying in the early stages of the air war. Lieutenant Colonel Georges Thénault, who had led the Lafayette Escadrille in World War I, reportedly said of his early pilots: "They shot down more than they were credited with."

*Kiffin A. Rockwell*
Department of History
Northern Illinois University
Dekalb, Illinois

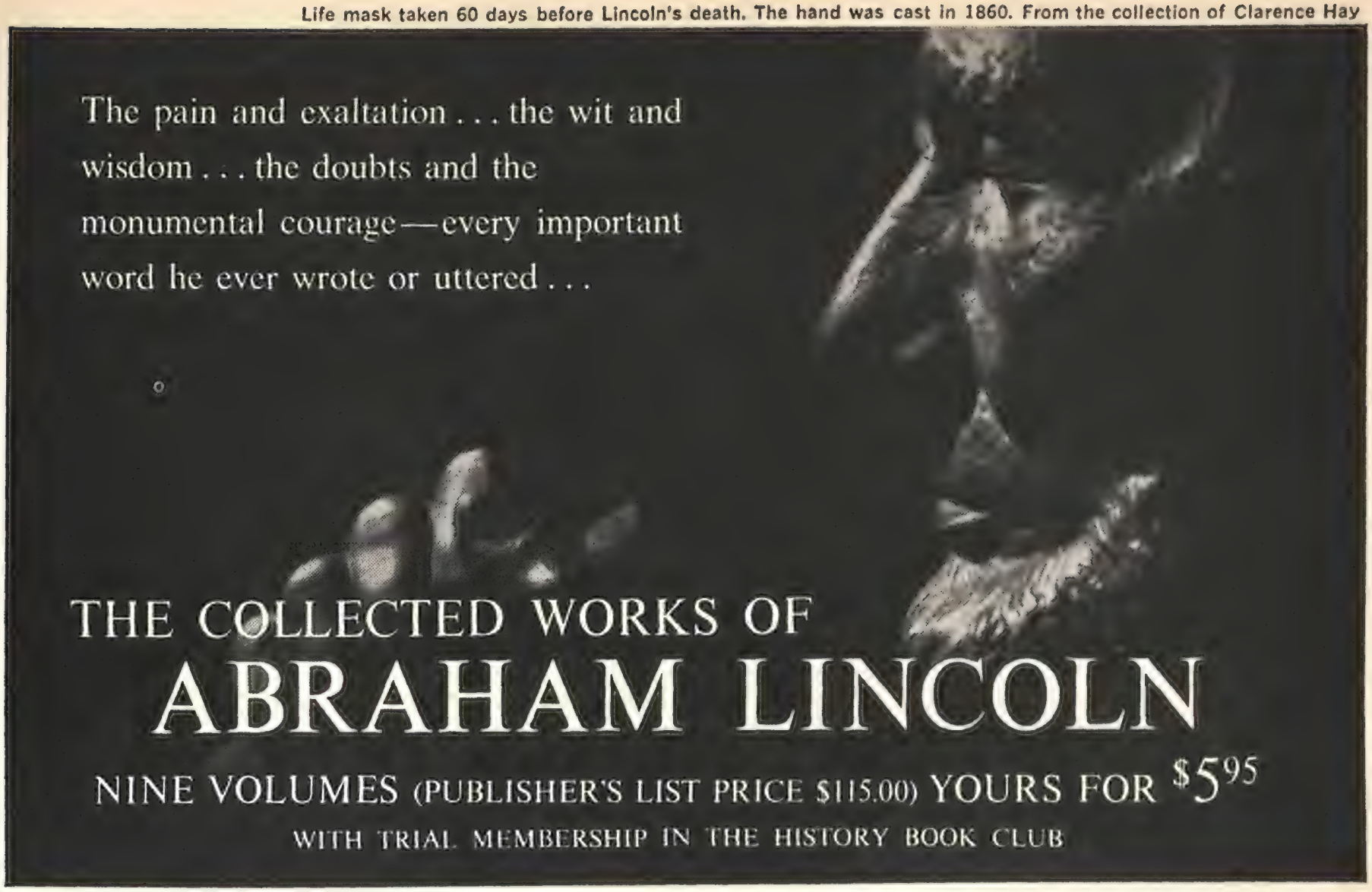
*Mr. Rockwell is the nephew of Kiffin Rockwell, who, as mentioned in the article, was the first Lafayette Escadrille pilot to down an enemy plane and was one of the Escadrille's first casualties.* Ed.

Dear Sir: I had always understood that the polo player, Tommy Hitchcock, one of the greats of the Twenties, was a member of this fascinating group. Yet, I did not see his name in your Escadrille roster. Could you tell me whether or not he was a member?

*Father J. Garvan Cavanagh*
St. Francis Xavier Cathedral
Alexandria, Louisiana

*Hitchcock was with a French operational escadrille other than the Lafayette.* Ed.

Life mask taken 60 days before Lincoln's death. The hand was cast in 1860. From the collection of Clarence Hay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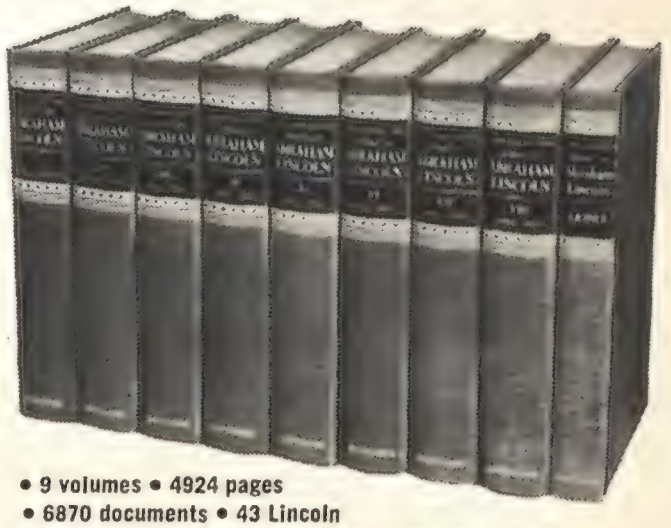

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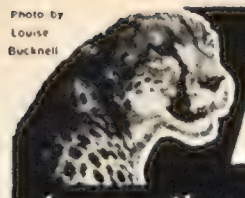

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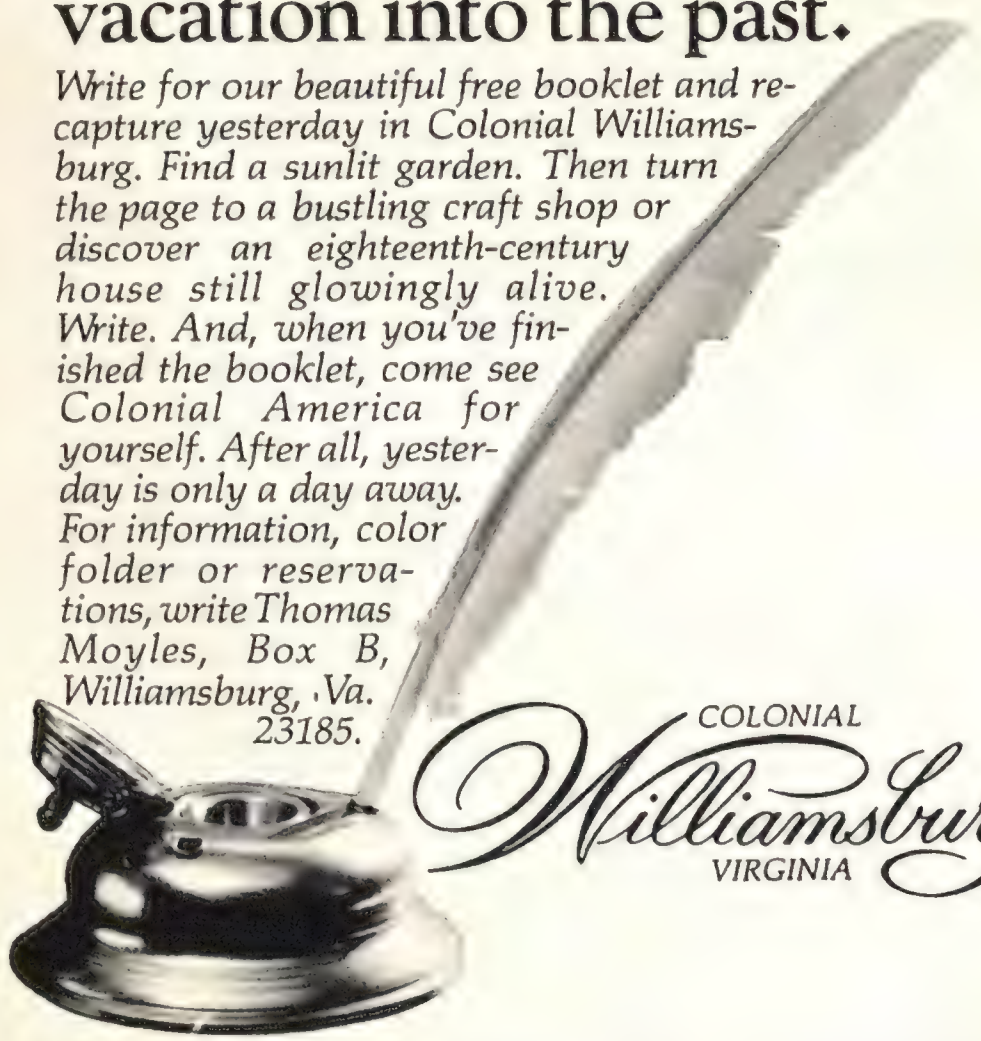

COLONIAL Williamsburg VIRGINIA


## *Frederick Law Olmsted*

Dear Sir: The picture in your article "Renewed acclaim for the father of American landscape architecture" is not of Fenway Park in Boston, as the caption reads, but of Jackson Park in Chicago—also designed by Olmsted. On the left and right of the picture is the Wooded Island; in the distance is the dome of the old building that was preserved after the Columbian Exposition and now houses the Museum of Science and Industry.

*James R. Bennett*
Dallas, Texas

*Mr. Bennett is correct.* Ed.

Dear Sir: Frederick Law Olmsted is an example of an outspoken man who influenced public opinion by his pronouncements. He pronounced on economic and social conditions which he did not fully understand. As a result, he inflamed public opinion and contributed to the perpetration of misconceptions about the pre-Civil War South that may have precluded the solution of underlying problems. These misconceptions are still contained in some textbooks and are a source of irrational prejudice against the South.

*John S. Spratt jr.*, M.D.
Columbia, Missouri

The Cotton Kingdom *is generally considered a standard work on the antebellum South, but some historians think Olmsted should have portrayed a society of many economic groups and far greater complexity.* Ed.

## *Phenomena, comment and notes*

Dear Sir: Sarah is not the only chimpanzee that communicates with man via language. Washoe, R. Allen and Beatrice T. Gardner's "talking chimp," uses sign language and displays abilities quite like those of human children.

*Terry Bontrager*
Lawrence, Kansas

*Washoe was the one to which we referred as follows: "Another captive chimp has been taught to read and write."* Ed.

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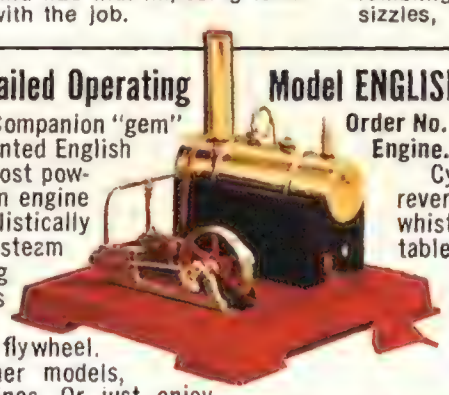

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*By Jane Stein*

# Coal is cheap, hated, abundant, filthy, needed

*With energy sources in short supply, engineers aim to make clean gas from coal, but the dirt will have to go somewhere*

King Coal is dead. Long live King Coal.

After decades of declining production and increasing disfavor, coal, our most abundant energy resource, has been staging a comeback. It is one of the ironies—and dilemmas—of our environmentally aware age that we will use more, not less, of this filthiest of fuels.

Underground coal mines have polluted the water table, harbored fires, some of which have been smoldering for decades, and caused millions of acres of surface land to subside, breaking roads and sewers and collapsing houses. Coal miners are often trapped underground; many more contract the miners' disabling disease, black lung. Strip mining, although twice as safe, has left lunarlike landscapes in its wake and polluted rivers and water supplies with silt and acid drainage. The blight of coal continues into the burning process, befouling the air with 60 percent of the 14 million tons of sulfur dioxide discharged a year by U.S. smokestacks.

Yet the energy demands of a growing industrial society are doubling every ten years while the nation's energy resources are dwindling—and this is the crux of the energy crisis that has suddenly forced its way into our consciousness. National reserves of natural gas—

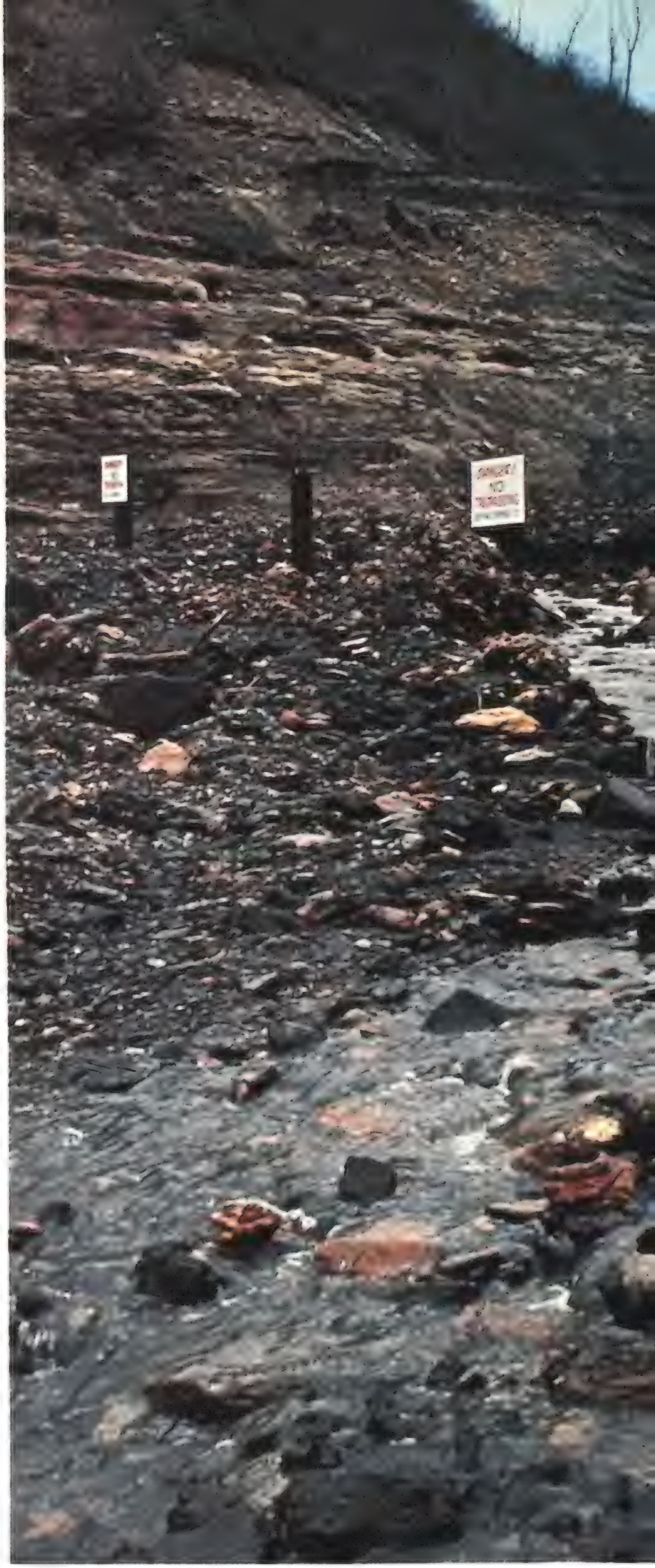
The Four Corners Power Plant pours sulfurous coal smoke into the formerly clear New Mexico sky. There will be far more of this before there is less.

the only widely used fuel that does not add pollutants into the environment—have dwindled, and demand has outstripped the supply. Domestic production is expected to peak in the mid-Seventies and decline thereafter. Old gas customers across the country are rationed, new ones rejected, and the United States is being forced into heavier dependence on foreign suppliers—including Algeria and perhaps the Soviet Union—resulting in far more expensive gas.

Oil is in short supply—current oil reserves in the contiguous 48 states are now at the lowest point in 20 years—and we rely more and more on high-priced imports from the unstable Middle East. Nuclear power accounts for less than two percent of the nation's energy production and, owing to a series of setbacks including construction delays and legal proceedings initiated by environmental groups over reactor safety, it is far from fulfilling its promises on schedule. The nuclear-breeder program is due on the scene no earlier than 1985, and even this program is beginning to find serious new critics. Pushed on the back burner by low funding are potential clean sources of electricity, such as solar energy and fusion (see SMITHSONIAN, November 1971 and December 1972). Energy conservation, perhaps the most fruitful avenue for averting an immediate crisis, is just beginning to be discussed.

In desperation over coming energy shortages, energy planners are turning again to dirty but ever abundant coal, found in 38 states with some one-and-a-half trillion tons of it still under American soil—more than 1,000 years' worth at today's recovery and consumption levels. The new wave of coal promotion is well under way already.

*In* SMITHSONIAN, *Jane Stein has written on thermal pollution and Athelstan Spilhaus of the Woodrow Wilson International Center for Scholars.*



Among the many unhappy and unavoidable by-products of strip-mining coal is acid runoff which

has blighted this West Virginia stream, rendering it hazardous to the health of fish and people.

Coal is fueling one of the biggest as well as one of the most disputed electric power projects in the country—the Four Corners Power Plant at Fruitland, New Mexico, near the joint state borders of New Mexico, Arizona, Colorado and Utah (see pp. 18-19).

The Navajo strip mine that supplies coal for the Four Corners Plant is one of the largest producers of coal in the country; some 22,000 tons daily are gouged from the reservation. Reclamation efforts so far have been failures, and the big generators spew some 350 tons of fly ash daily into what used to be the purest air in the country. Indeed, so bad has the haze quickly become from the Four Corners complex that its very smoke plumes are not visible beyond 100 miles. And all this is to provide electric power for places as far away as Los Angeles—where air-quality standards forbid the spewing of these pollutants.

Four Corners is the first of a planned coal-fueled system of at least half a dozen plant complexes in the Southwest, including another already completed plant complex at the southern tip of Nevada. The coal for this plant, ripped from a sacred Hopi mountain, is ground up at the mine, mixed with the region's precious water and piped more than 270 miles through a slurry line to the plant.

*A silk purse in the West*

This is only a taste of what may be coming. A government geologist sees the United States on the brink of "generations of strip mining for coal that will make the excavation for the Panama Canal look like a furrow in my backyard vegetable garden." Twenty-year forecasts call for 300 million tons of coal a year—about half of our yearly production—being processed by huge, refinerylike plants, surrounded by massive strip mines in the Western coal fields. But the product won't be coal—it will be gas, quadrillions of cubic feet of pipeline quality, pollution-free *gas*. We are promised a silk purse from a sow's ear.

Gas from coal—the process is called coal gasification—is a complex chemical transformation that changes nuggets of dirty coal into gas much like natural gas. What happens is that coal is changed into gas by adding hydrogen. To get the extra hydrogen, coal technologists turn to water.

Simply stated, the process is as follows. Water is heated to produce steam which reacts with the carbon from coal to make a hydrogen-rich gas. In addition to hydrogen, other gases such as carbon dioxide, hydrogen sulfide and ammonia are produced. The next step is to "clean" the gas, to purify it and separate out the unwanted constituents, leaving only carbon monoxide, hydrogen and methane. What is left is combustible but low in heat content compared to natural gas.

The final step—the hardest one and one that is yet to be proved in a commercial synthetic plant—is to upgrade the gas in heat content and cleanliness. This process, called methanation, calls for further reactions of the carbon monoxide and hydrogen to produce yet more methane (which is what natural gas is). All of this takes place at intense temperatures (upwards of 1500 degrees F.) and at pressures of more than 1,000 pounds per square inch.

The technique is an old one and goes back to the late 18th century when it was first used for lighting. Coal gas flourished until the advent of electric lighting and was subsequently used for heating. But then natural gas was turned from a useless and wasted by-product of oil (wells that gave off gas were flared and allowed to burn themselves out) into the cleanest, cheapest source of energy. In the 1920s and 1930s natural gas became available by pipeline, and the market for manufactured gas gradually evaporated.

The gas derived from coal a century ago was essentially a by-product; the primary product was coke, which was then sold for home heating and steel furnaces. Since the market for coke for home heating no longer exists—imagine our air pollution problems if coal was still used extensively for heating—the old techniques for coal gasification are impractical. In addition, "town" gas was low in energy content by today's standards. The new coal gasification technology aims at getting a clean-burning gas at the same heat content as natural gas—1,000 British thermal units (Btu) of heat per cubic foot.

Only one commercially proved coal gasification method operates today, and at that it produces gas at less than half the heating value of pipeline gas. This is the Lurgi process, developed in Germany during World War II, and still at work at plants in Western Europe, South Africa and Australia. Lurgi will make its American debut in New Mexico at two different sites in the mid-to-late 1970s. In addition, several gas companies are negotiating with Lurgi to build plants.

The Lurgi process produces a low-quality gas (400 Btu) which can be blended into the main transmission system of the 1,000-Btu gas currently being transported. But blending low-energy gas into high-energy gas has obviously limited possibilities, and engineers hope to devise a system to add to the Lurgi system which will raise the Btu value. A drawback to the Lurgi process is that it can accept only lump coal as opposed to the coal fines—dust and small coal particles—that are the product of strip mining. The New Mexico sites will provide the needed lump coal, but most of the coal fields now being eyed in the West will have to be strip-mined.

This is just one of more than a half-dozen coal gasification techniques under way at various stages of development, ranging from some in design stages through existing pilot plants. There is no single agreed-upon technology for coal gasification. At each step in the process there are several possible ways of designing the system, and most energy planners in the federal government are willing to support various approaches for now, believing that they cannot afford to decide prematurely on the wrong process.

### *Speeding up the pace*

But energy planners looking at the near future hope to speed up the pace. Through most of the Sixties, industry was not pursuing coal gasification and the Department of the Interior's Office of Coal Research had a low priority. "We were swimming against the tide," said George Fumich jr., OCR director, pointing out that some of their projects have been ongoing for nearly ten years.

It is only recently that coal gasification has found itself on center stage. It received its biggest boost from President Nixon's June 1971 energy message in which he called for a "greater focus and urgency" to developing the needed technology.

Only last December, New York State's Public Service Commission issued a report warning that nuclear power was not the answer to all the state's problems, that the breeder reactor was not only far off but equally fraught with problems. The Commission called for the rapid development of fuel cells and, significantly, of coal gasification.

In August 1971, after the President's energy message, an eight-year agreement was signed between the Department of the Interior and the American Gas Association to develop joint facilities. An estimated $300 million will be spent with the hope of building a small demonstration plant—about one-third capacity of a

Appalachian winter: A light snow accentuates
the wounds from a typically unreclaimed strip mine.

A behemoth grader with a 40-foot blade smooths out the huge furrows of a Kansas strip mine.

full-scale operation—in the middle or late 1970s. To bring it up to commercial size, producing 250 million cubic feet of gas a day, two or more operating units would be added in 1980. (So far, engineers are working on pilot plants that, they hope, will produce a mere 1.5 million cubic feet of gas a day when on full stream later this year.)

Officials at Interior are confident that commercial facilities are just 10 to 15 years away. Former Assistant Secretary Hollis M. Dole predicted last year, before his resignation, that coal gasification will produce two percent of the nation's gas requirements by 1985—which obviously won't make a great impact on our energy-consumption patterns. But by 2000, Dole anticipated, coal gas would account for as much as ten percent of the total gas demand. The rest of the gas supplies would come from U.S. natural gas reserves, liquefied natural gas piped in from Alaska or Canada, or tanked in from as close as Trinidad and as far away as Siberia. Boeing has circulated an artist's conception of a huge airborne tanker designed to haul liquefied natural gas vast distances. Additional supplies may come from synthetic natural gases made of naphtha and crude oil—techniques which are now being developed.

Coal gasification's value as an energy source is twofold. In the relatively short term it can help alleviate a tight fuel situation; in the long term, it can be used as a supplemental resource and, more importantly, as a "shelf" item—a dependable source that is always available, one that can be ordered and delivered within a few years.

Coal gas will be expensive—at least $1 per thousand cubic feet, about double that of natural gas today. But, assuming a severely declining natural gas supply, Fumich reasons that "pipeline gas from coal will be just as cheap—if not cheaper—than any other supplemental source such as gas from Algeria or Alaska or Russia. These imports are our gas alternatives and they are in the dollar and up bracket." Indeed, many critics have long held that natural gas prices have been artificially kept excessively low. They will inevitably have to rise now, but gas may not lose all its competitive edge since the prices of other fuels will surely rise also.

Coal gas as a *fuel* gets good marks from the environmentalists: It is a way of using coal, which is becoming difficult to burn under the ever increasingly strict air-quality standards. (In recent years, New York City, Boston and New Jersey, among others, have issued sulfur standards that virtually ban the use of coal as a fuel.) Coal gas creates little noise, water or air pollution, and requires no unsightly transmission lines since it will use already existing pipelines. But there are very serious environmental problems elsewhere in the coal-gas *system*. Coal is inescapably a dirty product: Getting it from the ground and converting it to gas are inherently dirty processes.

Coal contains up to five percent sulfur and 20 percent ash, both of which are harmful to the environment if spewed into the air, falling down as sulfuric acid rain, defoliating trees and bushes on the way and leaving a film of fly ash.

Sulfur must be removed in the coal gasification system because it acts as a poison to the catalyst. One solution is to collect the sulfur wastes through known and commercially available methods such as scrubbers, then collect and sell the waste product. But as a result of other antipollution efforts, sulfur is so overabundant that some natural sulfur mines may have to be shut down.

Ash can be used in the construction of cinderblocks or, if the transportation problem could be solved, it could be used for filling in strip-mined areas. While nothing would grow on it, ash used as landfill could be covered with good soil upon which vegetation would grow. Incredibly, some of the pilot projects currently under way have made no provisions for handling these wastes.

Water use is another potential problem: Vast quantities are needed for the hydrogenation process and for cooling purposes. Estimates are that a fully water-cooled coal gasification plant capable of producing 250 million cubic feet of gas a day would consume about 30 million gallons of water per day. That is only half of the water needed for a conventional steam power plant, according to Interior estimates, so the problem isn't how much water—but where all the water will come from.

Water consumption in the West—where most of the potential coal gasification sites are—has long been a problem. The big river basins, the obvious sources of water, are already overtaxed. So great is the water problem that future gasification sites will probably be limited by water requirements, not coal reserves.

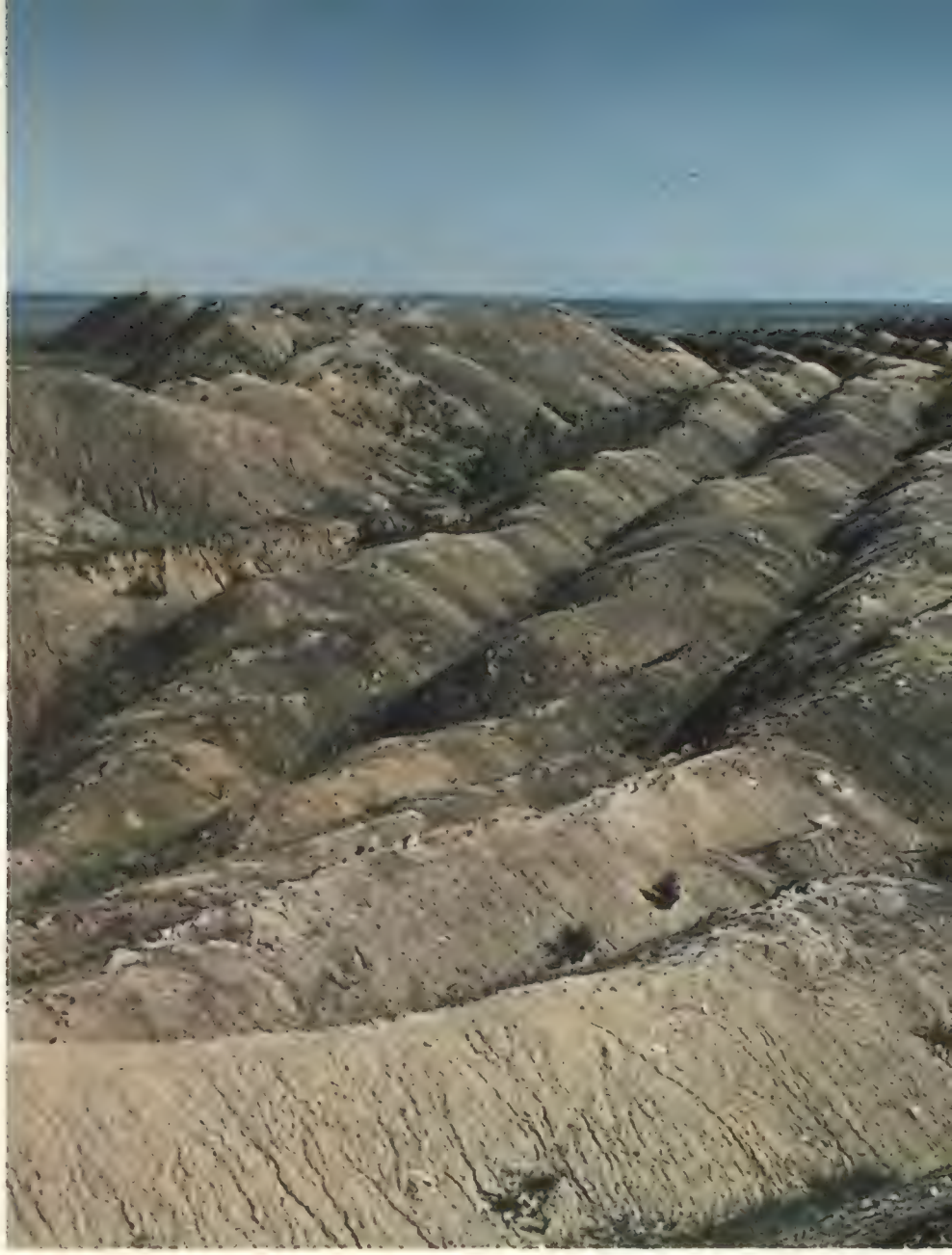
The major objection, however, to coal-gasification development remains the mining of the coal. The key is low-cost coal and this means strip-mined coal—with the specter of Appalachian horrors spread across the country. (One alternative—still in the experimental stages—is to convert to gas underground, called *in situ* gasification. It involves breaking up the coal formations with injections of chemicals and air, which then react with the coal to form gas. But nothing is problem-free: The environmental hang-up here is gradual land subsidence as the coal is converted to gas.) Strip mining remains the most alluring method because output per man-day is roughly double that of deep-pit mining, and operating costs are much lower. In 1970, strip-mined coal sold for $4.69 a ton; deep-mined coal was $7.40 a ton.

*The problem of reclamation*

Currently about 44 percent of all coal mined comes from stripping—a mere trickle compared to what is ahead. There are huge reserves of strippable coal in the West, particularly in Wyoming, Montana, New Mexico, North Dakota and Texas. This is mostly low-sulfur coal (which is good), but it also produces especially high amounts of fly ash (which is bad). Coal, petroleum and pipeline interests, along with land brokers and speculators, are already scrambling to assemble leases and rights to large tracts in these areas. And in the East—already spotted with "wasteland" areas—gas companies are busy seeking out options on major coal reserves in Appalachia, wherever there are sites large enough to support gasification plants.

The coal boom is bringing deep concern in its wake. Among the worriers is Senator Lee Metcalf (D-Montana): "The fossil-fuel development now contemplated in Montana and neighboring states will affect the land, the quantity and quality of water available for other uses and the air. If we don't have immediate and effective federal and state legislation to control strip mining, eastern Montana will become a wasteland." The government and the gas and coal industries play down these concerns about strip mining. "There is no reason," says Douglas King, Director of Research and Engineering at the American Gas Association, "why strip mining has to be so bad. The land can be reclaimed, but it is a question of economics."

Indeed, reclamation is often, though not always, possible—but among coal developers it is unpopular.



Where grades are not too steep, such moonscapes as this one in North Dakota can be reclaimed.

Costs run as high as $2,700 an acre, and strippers rarely spend more than $300 on rehabilitation—if they spend anything at all.

Meaningful reclamation of strip mines would add to the cost—anywhere from 10 cents to 50 cents per ton of coal. The average consumer would pay about 15 cents a month more for electric power, calculates Representative Wayne L. Hays (D-Ohio), who is a supporter of tough anti-stripping legislation. The public is willing to pay this small amount extra to protect the land from devastation, he declares.

Of the more than 1.5 million acres of American land stripped for coal, two-thirds are unreclaimed, the Conservation Foundation estimates, and the unreclaimed areas keep on producing acid drainage, erosion and esthetic blight. Even where there has been reclamation, it has met with mixed results. In flat areas, some reclamation efforts have been successful, but they seldom work in steep mountainous terrain. The most popular method of reclaiming is simply to level the top of the spoil site, rather than regrading it to the original contour.

There is a particular danger in strip mining in arid regions where water supplies are overtaxed. In many such areas, the natural vegetation can and will return eventually if—and it is a big if—the stripping process has not lowered the water table appreciably. Reclamation is *not* just a matter of economics.

While there is no total ban on strip mining (some states have partial bans), Representative Ken Hechler (D-West Virginia) has been an outspoken advocate of legislation to prohibit it altogether, a plan that seems unlikely to achieve much Congressional support. (West Virginia's Democratic gubernatorial candidate, Jay Rockefeller, took a stand against strip mining and lost in the 1972 campaign.) John McCormick of the National COALition Against Strip Mining, a lobby group representing more than 20 environmental groups, feels that if coal means so much to us as an energy source (as it should), and if stripping is the only way to extract it (as it is in much of the West), then "we should see about getting the best reclamation possible without worrying about costs. Plant roses if that's what will produce the best results."

Enforcement of tough reclamation regulations is clearly the major issue for environmentalists. State laws have provided exceedingly meager protection. More than half of the states have statutes requiring at least some degree of land restoration, but they are often undercut by ineffective backup regulations and limp enforcement.

At the federal level, there is no systematic strip-mining legislation. The only federal control consists of Interior Department regulations for mining on public and Indian lands over which the government has jurisdiction. Even here, inspection capabilities are inadequate, and there are no provisions for public participation. Nor do even the limited federal regulations apply retroactively: The vast acreage of strippable coal leased before the regulations went into effect in 1969 —some 2.4 million acres—are beyond the law.

Reclamation has removed most scars from North Dakota strip mine. Problem is to require such efforts.

Before Congress adjourned in October 1972, the House passed a bill to regulate surface mining of coal. The Senate had been working on a broader measure covering all mining. Time did not allow working out the differences between the proposals and mining industry opposition was also a factor in killing the legislation. There are strong indications that the subject of strip-mining legislation will be high on the list of priorities for the Ninety-third Congress.

Environmental groups and Congressional supporters —particularly Representative Hechler—feel that the failure to report a bill last year will only intensify the issue. "Now," he predicts, "there will be a pell-mell rush to strip huge tonnages of coal before a federal law is passed in 1973." But, he says hopefully, this will also "spur public outrage and result in vastly increased support for abolition."

Certainly, at the least, it will spotlight the need for reclamation laws and enforcement. Without stringent reclamation laws, coal gasification will be little more than a tradeoff of one pollution for another. It would help clean up urban areas with a cleaner fuel, but it would blight vast rural areas that are now relatively free of pollution and environmental degradation.

The second reign of King Coal is not likely to be a tranquil one.

*Text and photographs by Grant M. Haist*

# The courtship of albatrosses

*One of the most spectacular courtship dances among birds takes place each spring when the waved albatrosses wing into the Galápagos*

In flight an albatross is a grand thing, a solitary conqueror of the stormy air. On land it is a clown. The largest of the flying seabirds, its 8- to 11-foot wingspread allows it to wander effortlessly thousands of miles across the oceans. But these magnificent narrow wings provide little braking surface for making a landing. As a result, the albatross arrives on land with all the control of a windblown barrel, often bouncing off rocks or other birds that might be in the way.

Takeoffs are just as arduous. The albatross has somewhat thin, long legs and walks in a ludicrous swaying roll with frequent rest stops. To leave the ground, it must make an exhausting run with wings outspread until airborne on the ocean wind, or walk awkwardly the long distance from its nesting site to a sea cliff.

Not surprisingly, this great gliding machine uses the land rarely except as a place to court a mate, to breed and to raise its young. Directed by a still unknown guidance system, the albatrosses—and other large seabirds such as the black pirate, the frigate bird (see pp. 32-33)—periodically return to the islands of their origin and begin their courtship displays. Their complex

The elaborate ritual begins quietly as the two eight-pound birds touch their bills together.

rituals may have evolved as the means by which pair bonds can be formed of sufficient strength to keep the birds together long enough to raise their young. The presence of other birds of the colony seems to strengthen the impulse.

Hood Island, a small dot in the Galápagos some 600 miles west of the Ecuador mainland, provides a reasonably flat place for the waved albatrosses to land, although the "runways" are hazardously strewn with boulders and scrubby bushes. The waved albatross *(Diomedea irrorata)* is the only equatorial representative of the 13 species of albatross. For most of the year this species and all the other albatrosses ply the air currents of the oceans, gliding up and down on updrafts that bounce off the waves, seeking fish, squid or garbage from passing ships which the big birds often tail for days.

Beginning in the month of April the solitary waved albatrosses wing in to Hood Island, and tumble onto the ground at two main nesting sites. (All in all there are some 3,000 nesting pairs of these birds, all of which nest only on Hood.) Males generally arrive first, followed shortly by the females. Then the rival males, stretched to full height with bills agape, rush at each other and utter a ringing "Ha-ha-ha-ha-ha-ha."

Once a male-female pair forms out of this noisy competition, the courtship dance begins. The two birds may start by leaning forward to touch their large, yellow bills. The German zoologist Irenäus Eibl-Eibesfeldt saw waved albatrosses begin their dance with the male circling the female while both swiveled their heads back and forth from shoulder to shoulder.

With a hollow clatter, the bills then cross like swords, meeting about halfway from the crooked tips (see photograph below). Like fencers parrying, the birds slide their bills rapidly over each other in half circles, and this activity continues throughout the courtship dance, interrupted by a variety of other extraordinary ritualized movements.

Whenever one bird touches its beak to a particular feathered area on its side, the other bird claps its mandibles together in a clattering frenzy. The first bird then stretches its neck upward, pointing its bill to the sky, and emits a loud, high-pitched "Moo-ooo-ooo."

Like fencers, one bird lunges, the other parries,
and they slide their bills over each other.

After a quick bow, the pair may circle, stretch their necks upward and, facing each other, open their bills as wide as possible. They utter no sound, but there is a resounding clunk when the bills snap shut.

These and other dance positions follow one another in rapid succession in no particular order and without pause for as long as 30 minutes. The male directs the dance: Each maneuver evokes its appropriate answer, and the female responds to the male's lead, sometimes in halfhearted weariness after several minutes of furious activity.

The courtship ritual ends abruptly. In the dance I witnessed, one bird tucked its bill on its breast and walked away, swaying in a rolling side-to-side motion, followed by the other bird in the same exaggerated gait. The dance concluded with one bird squatting, the bill pointed between its feet. Its neck jerked up and down, and I heard a low call, presumably a signal that this nesting site had been taken. (This same bobbing motion is also always performed—and the same low call given—when a parent returns after a brief time away from its egg or chick. Apparently these are signals by which the chick and parent recognize each other in the crowded colony.) In Eibl-Eibesfeldt's report, the dance ended with both birds pointing to the ground with their bills, followed by mutual preening of the neck plumage. Mating takes place shortly afterward, and the entire procedure may be repeated several times.

There is no pretense about building a nest. The single egg is laid on the open ground, and a long vigil then begins. Both the male and the female incubate the egg, and usually the male takes the first stint.

Hood Island is an arid oven during the day, and the flat areas where the albatrosses nest are scorched by the sun. Any egg left alone for even a few minutes falls prey not only to the searing heat but to a local marauder, the insatiably curious Hood mockingbird that investigates everything in its territory. Nothing escapes its inquisitiveness—even the buttons of my jacket had to withstand a series of pullings, and my gadget bag was probed, as was everything else in camp, for anything that could be lifted.

I saw one of those mockingbirds find an abandoned or perhaps temporarily unguarded albatross egg. It pecked the smaller end until it cracked and then began to dip out the contents. Within a few minutes several others arrived to share the feast.

With its large wingspread and a body somewhat larger than that of a domestic goose, the adult waved albatross is a formidable animal with no known predators besides Man. (It is noteworthy that in 1965, breeding was much curtailed by unusually great swarms of

On the proper signal, one bird points its bill skyward, emitting a high-pitched "Moo-ooo-ooo."

mosquitoes.) Yet these great birds—loners for most of their lives—can protect their kind against the depredations of the mockingbirds not so much by main strength as by a finely tuned capacity to cooperate in guarding the nest. And the proving grounds for this capacity is in the elaborate courtship ritual. A nesting pair which fails and loses its egg cannot, as some other birds can, breed again that year.

A successful pair's vigil goes on for some two months until the egg hatches, and then continues for yet another month when the chick will be large enough to defend itself. Though considerably more free now, the parents must still be attentive, feeding the chick at ever increasing intervals, for the young bird will not make its first flight for some six months.

By January at the latest, the young albatrosses are ready to make a clean break from Hood Island. They head off into the prevailing winds, and those which survive this critical time will stay at sea until several years have passed and they have reached breeding age. The parents also disappear at this time, each winging off on a solitary route that may carry it as far north as Panama, as far south as Peru, and as far west as Japan. These adults will stay at sea for over a year: Biologists believe that waved albatrosses breed only in alternate years (although there is good evidence that a pair which has lost its egg may breed the following year).

Then in April, only three months after the last fledgling takes wing, Hood Island once again begins to resemble the flight deck of a busy aircraft carrier as another wave of prospective parents glides down into the newly forming colonies, adding to the frenzied, bobbing activity and to the sounds of clattering beaks and high-pitched calls. Not only do these adults navigate to the same island, but usually to the same mate, an extraordinary example of constancy born of a strong bond that is reinforced regularly in the noisy ballet of courtship.

The waved albatrosses perform one of the most elaborate dances of all seabirds, but their performance is rivaled elsewhere in the Galápagos by the frigate birds. Warbling and waggling their heads, with their long black wings outstretched, the large males scan the sky for females. Once a female has been attracted, she seems almost hypnotized. She may begin to waggle her head too; the bills are passed over and under each other. The display may go on for hours, even days, in a series of head-waving crescendos. Though it is less varied than that of the waved albatross, the frigate bird's ritual may well be the more spectacular of the two—if for no other reason than (see next page) the frigate bird has the benefit of an elaborate costume.

Soundlessly, bills agape, the birds face one another. The bills snap shut with a loud clunk.

Though its job of helping to attract a female is over, the scarlet throat sac of this great frigate bird male will remain inflated during the long head-waggling, wing-waving, noisy courtship ritual.

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*By Bern Keating*

# The epidemic hunters now use statistics as much as dramatic detective work

*As one disease virtually disappears, others crop up. Each is relentlessly pursued by scientists at the Center for Disease Control*

"I've got it. The woman with typhoid in Florida and the man with typhoid in Alabama both ate lunch the same day aboard the same charter fishing boat in Mobile Bay."

The excited voice boomed through Dr. J. Lyle Conrad's no-hands telephone amplifier and filled the cubbyhole that is one of the nerve centers of the Epidemic Intelligence Service of the national Center for Disease Control (CDC) in Atlanta, Georgia. There, Dr. Conrad, who is chief of the Epidemic Intelligence Service field services, gathers reports from field workers and dispatches his forces to trouble spots.

"It's a good start," Dr. Conrad said into the phone. "But you're only on the top of the curve statistically. Maybe 20 other people ate the same lunch. Until we run down their histories and a thousand other factors, you've just turned up one more interesting fact to feed the computer."

Thwarted of his coup, the young medic protested. Dr. Conrad soothed him and asked him to take the first available plane to Texas to join a team studying lead emissions from a smelter.

"His first week in the field and his first big case," Dr. Conrad explained. "Naturally, he's excited by turning up this really promising lead. But he'll find out soon enough that most of the good work that comes out of

*Mississippian Bern Keating often collaborates with Dan Guravich on articles and books including, most recently,* The Gulf of Mexico.

For an oral rabies vaccination project, beagles are kept in hygienic kennels. Beagles are excellent

*Photographs by Dan Guravich*

experimental animals because, among many reasons,
they are short-haired, well-disposed and available.

CDC is based on grinding statistical drudgery as well as exciting field work. If it hadn't been for a lot of plodding statistical and laboratory work, we never would have cut typhoid down to 300 or 400 cases a year. That's so few that linking any two cases by detective work is child's play."

Nonetheless, it is the epidemiologists' detective work, the very stuff of drama, that has dominated feature articles about the Center for Disease Control. But the Epidemic Intelligence Service is only part of one of 12 programs directed from Atlanta.

The Center grew out of an agency set up for control of malaria during World War II. By 1946, the malaria office was absorbed into a larger complex, organized to bring together health services few states could afford. The name became the Communicable Disease Center. Fear of bacteriological attack during the Korean and Cold War years expanded the Epidemic Intelligence Service. The Venereal Disease Program moved from Washington, D.C., to Atlanta in 1957; the Tuberculosis Program in 1960; the Division of Foreign Quarantine in 1966. When the Nutrition Program joined the other services in 1970, the Communicable Disease Center changed its name to the Center for Disease Control. Since then, the National Clearinghouse for Smoking and Health has come under the Center's administration but has remained housed in Washington.

About 3,500 Public Health Service employees staff the Center; 1,900 in the Atlanta area and the others at various field stations. Because the Center normally works through state and local public health departments, the public is rarely conscious of most of its services. But the Center is a coordinating agency behind widely publicized and dramatic vaccination programs such as the polio campaign which, since 1956, has cut the paralytic cases in the United States from tens of thousands to only 17 in 1971. Measles used to hit virtually everybody, sometimes causing severe aftereffects or death; rubella has caused tens of thousands of heartbreaking birth defects from deafness to cerebral palsy. Both diseases could well disappear in the United States before children born today are old enough to read the words.

Again the phone in Dr. Conrad's office boomed, this time with a query about a mislaid culture of a suspected flu strain taken from patients on a ship docked in Guam. Dr. Conrad reported it had just been found in Honolulu.

The chief epidemiologist for Canada called in the name, license number, vacation address and phone number in San Francisco of the father of an eight-year-old French-Canadian boy who, the day before in Oregon, had been badly mauled by a German shepherd. The father had disappeared with his son without seeing a doctor. Oregon health authorities were worried because the unprovoked attack strongly hinted at possible rabies, and the severity of the bites meant the boy might need immediate Pasteur treatment. The Canadian doctor, after business hours, had identified the vacationing family and even found their West Coast address. Dr. Conrad relayed the information from

J. Lyle Conrad is the unflappable chief of field services for the Epidemic Intelligence Service.

At left, two scientists pause outside the door of the Center's Maximum Security Laboratory.

Canada to a suddenly frightened father in San Francisco and to relieved authorities in Oregon.

The hectic hour I spent at this hub of a nationwide intelligence network was only routinely busy, Dr. Conrad assured me. A 24-hour telephone watch by duty officers keeps the service awake around the clock and, within an hour of a call for help, a doctor can be on his way, either from the main center in Atlanta or from selected state health departments located throughout the United States and in a few key foreign countries.

In spite of its successes, the Center's work is far from done. Its director, Dr. David J. Sencer, points out that each year infectious and respiratory diseases cause 140,000 deaths among the American people, 885 million days of restricted activity, 145 million days of school missed, 130 million workdays lost. And as one disease comes under control, the Center shifts to another target. Scientists are now applying the statistical methods of epidemiology to heavy-metal poisoning, birth defects, leukemia and drug abuse.

When Dr. Conrad dispatched his field doctor from Alabama to Texas, for instance, he switched the medical detective's mission from tracking down a source of salmonella infection to running blood tests on a statistically balanced sample of the El Paso population to see if fumes from a lead smelter are poisoning the air, and, if so, how rapidly the poisoning drops off with geographical distance from the chimney. Only after the tedious application of statistical plotting methods will the Center know the smelter's innocence or guilt. The statistically sound small sample in Texas will give results within five percent, plus or minus, of an expensive and time-consuming mass test. Similarly, immunization programs have shifted from widespread and indiscriminate vaccination to concentration on subjects especially susceptible to the target disease.

"For instance, some legislators proposed making vaccination for rubella [German measles] a precondition for issuing *all* marriage licenses," said Harold Mauldin, deputy chief of the Immunization Branch. "We had to point out tactfully that 23 percent of the girls getting married today are already pregnant—and the early months of pregnancy is when rubella does the worst damage. We would not recommend vaccinating this group of young girls because we can't rule out the possibility that the attenuated rubella virus in the vaccine might harm the unborn child. Besides, 85 percent of nubile girls are already immune after their child-

hood attacks, so shots for them would be completely wasted.

"The Public Health Service approach is to immunize schoolchildren in the lowest grades so they won't carry the disease home to mothers who may be in the first trimester of their pregnancies. That way, we get the maximum good out of each shot with least risk to women who may be pregnant."

Since 1969, public and private physicians have vaccinated 36 million children against rubella. To stop the disease, 60 million children must be vaccinated but, counting on the past successes, Dr. Sencer is optimistic. "There is little doubt that we can bring an end to rubella in the United States."

On my visit to the Tuberculosis Branch, I had a dramatic demonstration of the technique of "zeroing in on the vulnerable." After hearing me idly mention that my X rays show unexplained scars on one lung, Dr. Phyllis Edwards, chief of the division, popped a needle into each of my arms to test me for dormant tubercle bacilli.

"If your arms are smooth 48 hours from now, you're clear. But if you react by developing hard blebs like beestings, we'll measure their width. Any more than ten millimeters and you get another X ray. If you have scars, sure enough, you'd better start a year's course of taking isoniazid tablets, because you're a prime candidate to develop active tuberculosis."

Dr. Edwards explained that 16 million Americans have had an encounter with tuberculosis and carry dormant tubercle bacilli. Unlike measles or smallpox, an encounter with tuberculosis does not confer immunity. Far from it. Once invaded by the tuberculosis organism, a person becomes especially susceptible to an active attack whenever his defenses drop from fatigue or a bout with another disease.

"The new active cases reported yearly—more than 35,000 in 1971—come almost entirely from that 16-

Most of these goats will be blood donors, providing rare serum antibodies for various laboratory tests.

To test effects of a viral reagent, an aide inoculates mice in a germ-free isolator.

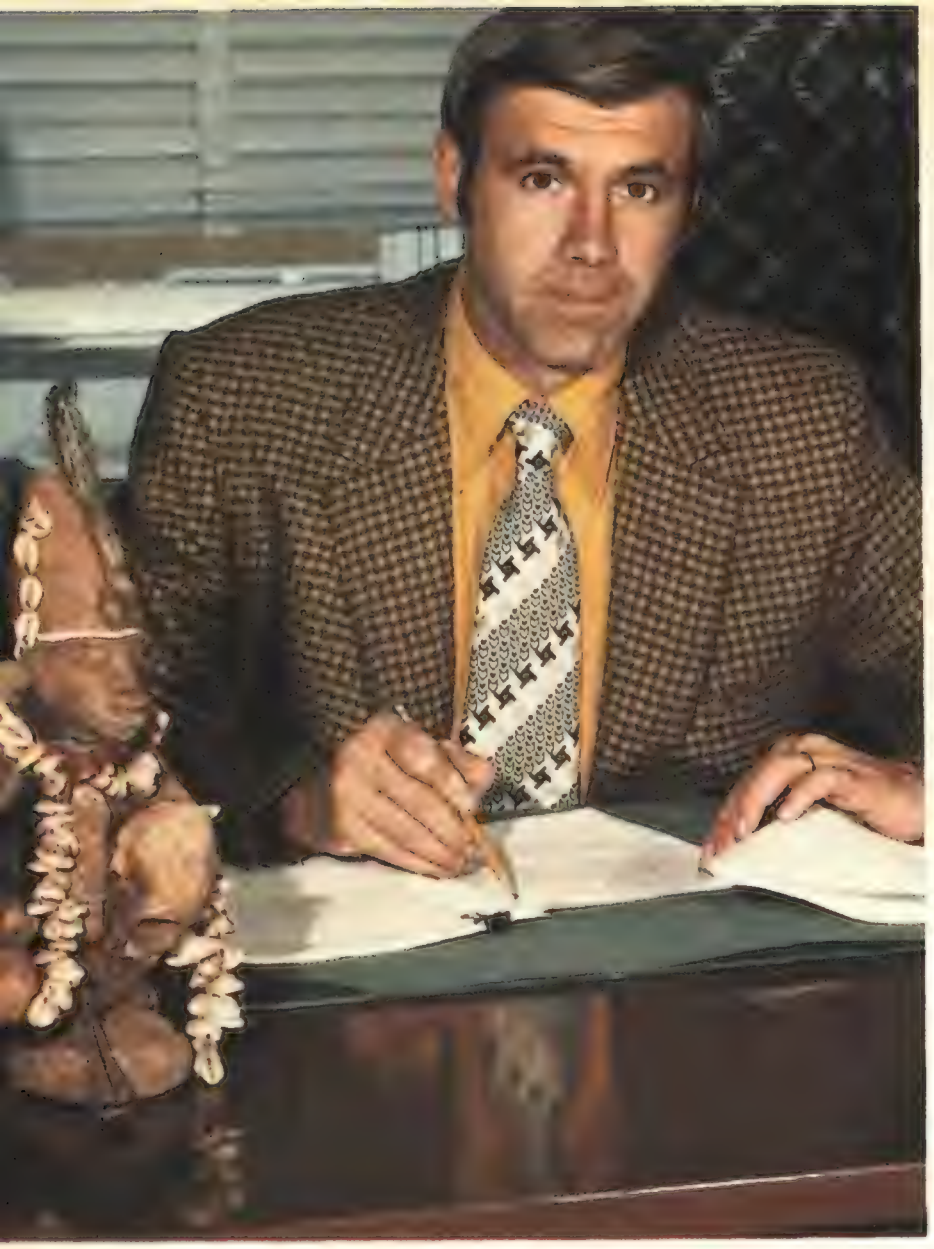
million-member reservoir. And most people in the reservoir are aging, so every year the median age moves a notch upward with little recruiting from the young.

"That's why mass X-raying of chests from a mobile van in the supermarket parking lot is a waste of materials and skills. It's more efficient to find the eight percent of our population especially susceptible to active TB because they are carrying dormant TB. The skin test like the one I just gave you will find them. Then, we X-ray to find those with lung scar tissue. Those are the dangerous cases that must start taking isoniazid immediately. After them, come patients with diabetes or other debilitating diseases."

Ninety-five percent of active tuberculosis cases can be cured by chemical treatment, and patients that show dormant TB can virtually eliminate any chance of suffering an active outbreak by faithfully taking isoniazid tablets for a year.

"By testing surrounding contacts we wall off every active case discovered. That's how we get maximum good out of our testing and X-raying programs—by going after the probables or even the possibles instead of scattering efforts over the whole population. Every dormant case discovered and treated shrinks the source of further infection."

With a crusader's fervor, Dr. Edwards sees a chance of wiping out her job by wiping out the disease in this



On the desk of Dr. William Foege, the director of the Smallpox Eradication Program, is an idol of an African cult that worshiped the disease.

country. The tuberculosis doctors are in a contest with those in the Smallpox Eradication Program to be among the first in history to eliminate a human disease.

Dr. William Foege, director of the Smallpox Eradication Program, talked to me as he paced before an African idol sacred to a cult that worshiped smallpox and sacrificed before the god to appease its wrath.

"When, in 1966, the World Health Organization undertook to wipe out smallpox everywhere in the world by 1976, the United States agreed as its share of the job to assist 20 countries of West Africa. The United States agreed to furnish vaccines, vehicles, jet injectors and personnel for training African paramedics to do the actual vaccination. Field work didn't get underway till 1967, but by November 30, 1969, in the little market village of Burbon, Niger, the 100-millionth West African was vaccinated, a year ahead of schedule."

Even in the grim epidemic areas where 12,000 cases and 3,000 deaths annually were commonplace, the vaccination teams did not limit their activities to widespread mass inoculation. Applying the CDC's statistically based method of getting the most benefit from each shot, teams rushed to the scene of an actual outbreak and hemmed it in by vaccinating everyone who had been in contact with the ill.

"At the beginning of the program, the five nations with the highest incidence of smallpox in the world were in West Africa. Within 34 months of the first vaccinations, 19 of West Africa's 20 countries reported no cases. Nigeria then reported its last case in May 1970. In three years and five months, the program had brought West Africa's 120 million people from the world's highest incidence of smallpox to zero." Brazil reported its last case in April 1971, so the Western Hemisphere is free of the disease. Elsewhere in the world, smallpox occurs occasionally in fewer than a dozen countries.

So firmly is smallpox under control that the Center no longer recommends routine vaccination of children. In recent years the side effects of vaccination caused more deaths than three or four importations of smallpox would cause—and there has not been an importation since 1949.

*Quarantines and rabid foxes*

Eradication of smallpox has had its impact on another department of the Center. The quarantine service no longer routinely requires a smallpox certificate from the returning traveler. Instead, he is asked to glance at a weekly list of countries where smallpox has been reported. If the traveler has not been to those countries, or if he has been there and shows a smallpox certificate, he passes freely. If he has been to an affected country, but has no certificate, he is placed under a surveillance order and sent on his way. His local public health doctor keeps an eye on him until the incubation period is over.

The new techniques have also been felt in the work of the quarantine service since it moved from Washington to the CDC. Joseph Giordano, acting director of the Foreign Quarantine Program, explained the new procedures:

"A few years ago, all travelers had to pass the personal scrutiny of a quarantine officer. Passenger ships were held up for hours, merchant ships lost millions of dollars in idle time waiting permission to dock and unload. That system of eye-to-eye confrontation would be intolerable today. Imagine the uproar at a major international airport with three 747s arriving at once and fewer than ten quarantine officers to inspect the lot.

"Nowadays, if a pilot reports no illness, passengers get a swift examination by an Immigration and Naturalization Service or Quarantine agent, for the two services have combined forces and doubled the efficiency and speed of passenger screening."

The speeded system spots about 200 possible quarantinable cases a year, close to the performance of

Row after row of cages contain mice which Laboratory Division scientists check for signs of infection after inoculation with pathogens.

the tedious old method. Among the cases held for observation during my visit to the Center was a shipment of chimpanzees that had been exposed to rabies. I drove to the CDC farm at Lawrenceville, northeast of Atlanta, to talk to veterinarians Dr. George Baer, chief of the Rabies Laboratory Investigation Unit, and Dr. Gerry Winkler, chief of the Rabies Control Unit.

They told me that animal species carry more than 100 diseases transmittable to man and that more diseases pass between animal and man than strictly between human beings.

"Just after World War II," Dr. Baer said, "the states reported 10,000 cases of animal rabies a year, 85 percent in dogs. Since the initiation of vigorous vaccination programs, reported cases are down to 4,000, of which only 300 are dogs and a few in other domestic animals. The others represent a sudden spurt in wildlife rabies.

"Before 1953 we didn't even know insectivorous bats could have rabies. Now, we find it in bats virtually whenever we look for it. Rabies in raccoons used to be sporadic and rare. Now it is well established throughout Florida and has spread deep into Georgia, moving northward about 25 to 50 miles a year." Foxes and skunks are the most susceptible animals; in Europe in the Sixties, rabid foxes became a serious scourge.

Dr. Winkler showed me a waxed dog biscuit. "This bait is impregnated with a live rabies virus that we think would immunize any animal that ate it," he said. "Essential laboratory testing is just about finished. Next step is to scatter the bait in the field to see if it will control rabies in the wild. A tempting test area would be a small island like Grenada in the Caribbean, where we would attempt to wipe out rabies among the mongooses."

Driving home 48 hours later, I inspected my arms and stopped to telephone Dr. Edwards that they were smooth, and so I presumably had no history of tuberculosis, lung scars or no. She assured me that even negative information adds to knowledge.

And so I consciously became a part of the immense store of public health information in the Center for Disease Control files. But then virtually every living American's record of communicable disease has, unknown to him, been pushing programmed queries one direction or another in the computer and guiding these disease fighters in planning their quiet field campaigns.

Relaxing in the arms of a technician, a two-month-old beagle puppy that was fed experimental rabies vaccine in a biscuit is now protected against the disease.

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Exxon has been instrumental in setting up many organizations dedicated to rapid and effective cleanup in the event of oil spills. Each of our U.S. refineries has a full-time staff of environmental specialists.

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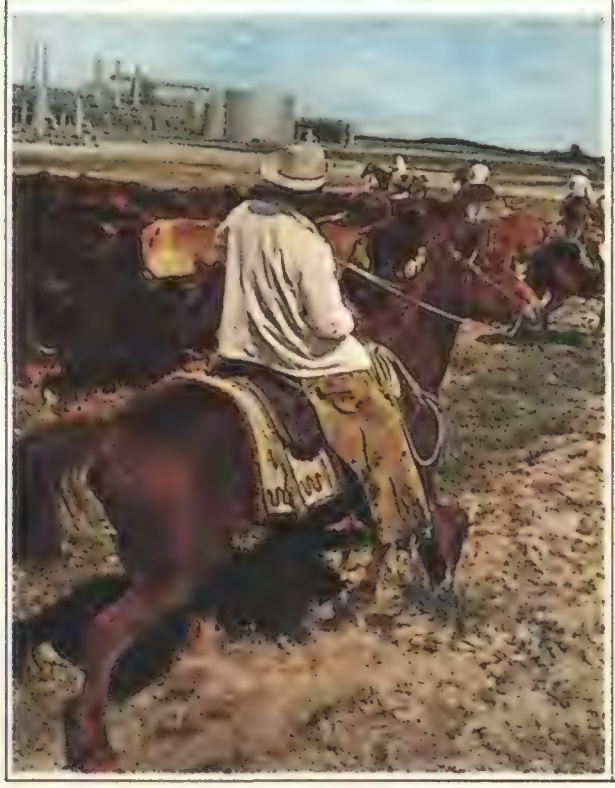

## Exxon research scientists average a patent a day every working day.

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And for nearly as long, Exxon has supported fine arts through competitions around the world, educational experiments like Harlem Prep, and excellence in television programming like *An Age of Kings* and *Play of the Week* and, more recently, *Vibrations.*

Beyond this are the individual activities of our many employees working, often with Exxon support, in community projects as varied and numerous as the skills they offer.

## We'd like you to know Exxon.

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*By Reidar F. Sognnaes*

# America's most famous teeth

*What kind of dentures did Washington wear?*
*Wood, elephant tusks, elk's teeth, gold?*
*The truth can at last be made 'a parade of'*

Pennsylvania Academy of the Fine Arts

A detail from Gilbert Stuart's Washington, probably exaggerating his dental disfigurement.

This elaborate lead-based denture was made for Washington by artist Charles Willson Peale.

Washington's first denture was ivory with human teeth, including one of Washington's own (far left).

Hole in plate was for his last good tooth, later given to John

Because George Washington lived 50 years before the invention of the camera, we have had no clear idea of what he really looked like, least of all, the appearance of what are often highly expressive parts of a person's face—the mouth, the smile and the teeth.

According to biographer James Thomas Flexner, Washington's most famous portraitist, Gilbert Stuart, disliked his subject and deliberately overemphasized the disfigurement caused by the President's false teeth. The artist "savagely" distorted Washington's mouth, says Flexner, and he concludes that the Stuart portraits have "encouraged the world to think of Washington as the hero with the ill-fitting teeth."

There is much to this, but a considerable number of myths have attended Washington's dentures, most notably that he had a set of wooden teeth. He did not. Nor were any of his dentures made by Paul Revere.

During the last few years I have made precise examinations of all the dental relics attributable to Washington, using a nondestructive technique of the artist and the scientist known as microreplication.

From the microreplicas I have tried to re-create the dentures precisely the way they were made nearly two centuries ago. I am now inclined to believe that five different types of teeth and tusks were used—from elephants, hippopotamuses, cattle and probably a walrus to man, including some of Washington's own.

By the time of his inauguration, he had only one tooth left. The first set of dentures known to have been worn by the President and still in existence were made by the New York dentist John Greenwood in 1789. The lower denture was fastened via a hole in the ivory base to his one remaining tooth, a lower left premolar. Not surprisingly, this lone tooth soon became eroded around the neck, loosened and came out. Greenwood was allowed to keep it and ultimately it was donated to the New York Academy of Medicine.

According to the literature, this lower denture had a base made from a hippopotamus tusk, but when I examined the original in the New York Academy's Rare Book room, I noted markings, like tree rings, characteristic of elephant ivory. Later, I was able to duplicate this denture base from an elephant tusk which a Los Angeles philanthropist had brought from Kenya and donated for my research at UCLA.

At least one of the other teeth fastened to the ivory base was Washington's own: a lower right molar. Another tooth fractured and is missing from the denture. It is now in the custody of the Sons of the Revolution in the State of New York and is on exhibit in a small gold-framed glass medallion in the museum upstairs in Fraunces Tavern in New York.

*Dr. Reidar F. Sognnaes is a professor of both anatomy and oral biology at UCLA and took the photographs of the teeth.*

Greenwood, the New York dentist,
who kept it on a watch chain.

Fractured incisor missing from denture at left
is now on display in New York's Fraunces Tavern.

Another lower denture, the remains of which are in the possession of the Medical College of the University of London, is still shrouded in mystery. Half of it—the left side—is missing and is rumored to have ended up somewhere in South America.

The animal substance from which it was made appeared unlike that of any other of the known Washington dentures. I found no typical "fingerprints" of elephant or hippo ivory. I did notice on the denture's lower rim, a small calcified area, characteristic of the calcified core of walrus tusks when these animals reach maturity. So, apparently, this denture was carved from a walrus tusk.

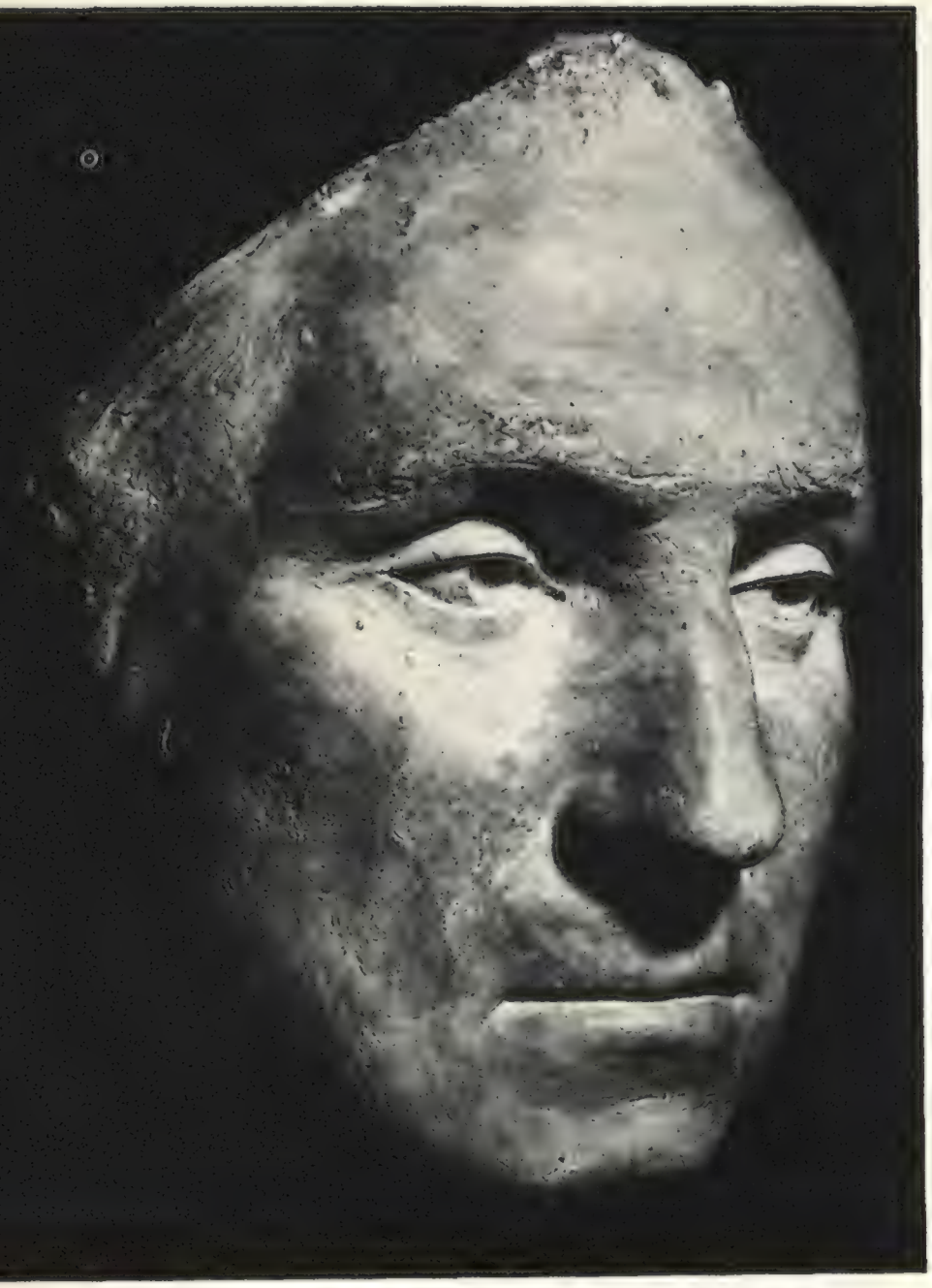
The material of yet another denture resisted identification for some time. This set is attributed to Charles Willson Peale, the artist who had painted Washington's portrait many years earlier (1772). Curiously Peale chose a lead alloy for the base of the dentures, connected by two powerful steel springs. These served to press the plates closely to the gum tissue. Misconception about this lead-based set of teeth, that is firmly planted in the literature, is that they weighed three pounds. I have weighed them. The entire set, lead, springs and teeth, weighs no more than four ounces, though that is heavy enough compared to modern dentures. All in all, once Washington tried this curious construction, he must have liked it. In addition to the strong spiral springs, the force of gravity probably also served to seat what otherwise might have been a loose, wobbly lower denture.

The teeth in the lower jaw, of the Peale denture, were fixed to the plate by a connecting metal rod and were of human and elephant origin. Tradition holds that the upper teeth were fashioned from those of an elk. I went to considerable trouble obtaining appropriate samples of elk teeth, but no matter how I have tried to grind them in place, none can be made to correspond to the teeth in the Peale denture.

At one time I considered a bit whimsically trying donkey teeth, which had the attraction of making Peale's effort a bipartisan denture: elephant below, donkey above. But I soon learned that donkeys were not imported to the United States until later. Also, the political symbolism was still to come.

After several false starts I reasoned that Peale would, of course, have had as much access to farm animals as to wild game. Ultimately, I examined dairy cattle that were six years of age, and it suddenly struck me that by minor grinding I could duplicate precisely the appearance of the original and I have done so.

Yet the lower incisors of cows are very large and unusually white compared to average human teeth. Charles Willson Peale may well have had special reasons for choosing bovine teeth. On the one hand, he may not have approved of the effect which other dentures had on Washington's profile. And, as noted



Houdon's bust was made from life mask in 1785 when Washington still had a few original teeth left.

Right half of denture now in University of London was probably carved from the tusk of a walrus.

above, Peale had painted a younger Washington and thus had seen what his natural teeth looked like. So with an artist's sharp eye for shapes and shades, he may have chosen to make teeth that were very white and large, ground square in harmony with Washington's square, rather than oval, facial contour.

This was not true of Washington's next and probably last set of teeth made by John Greenwood, who had not met his famous patient until Washington was virtually toothless. On exhibit in the National Museum of History and Technology of the Smithsonian Institution, they are best known and, some believe, the *only* known artificial teeth worn by Washington. The upper denture is considered one of the first made with a swaged gold plate to fit the palate. To this was fastened two segments simulated to look like rows of white enamel-covered human teeth. In trying to duplicate this upper denture, I found that these segments of teeth were prepared by making two cross sections of a good-sized canine tooth from the upper jaw of a hippopotamus. Only in this way could I match the exact "tooth" alignment or curve.

*A choice of pain or malocclusion*

According to correspondence between Washington and Greenwood, it proved difficult to fasten the hippopotamus tooth substance to the gold plate. And Washington was quite specific in his directions, in an attempt to avoid the appearance of having malocclusion. Finally, Greenwood had to rearrange the position of the teeth and secure them to the gold plate with several braces, which evidently were not present on the original. The braces can be seen clearly today and the sharp edges must have caused considerable discomfort to Washington's tongue and palate. This upper denture was held in place by gold spiral springs attached to the back portion of the lower denture.

The lower denture proved much more difficult to duplicate. First of all, earlier literature indicated that this lower denture was originally carved from one solid piece of hippopotamus tusk.

I found, however, that the lower denture was constructed from *both* elephant and hippopotamus tooth substance. The base showed typical markings from an elephant tusk. Fastened to this ivory denture base were two curved hippo ivory segments which again were carved to look like small, lower human incisor teeth with white enamel-covered dentin. In turn, these two segments were fastened to the ivory base by means of six wooden pegs of the diameter of toothpicks.

What, then, did these dentures really do to Washington's appearance? We cannot know for sure. The truest rendering of Washington's face is the life mask in plaster of paris prepared at Mount Vernon in 1785

by Jean Antoine Houdon of Paris. It is now on permanent exhibit in the Pierpont Morgan Library in New York City. Contrary to impressions one receives from famous portraits, I was struck by Washington's firm and handsomely contoured mouth. Certainly he was more attractive than in the face of Stuart paintings—but by then he had resorted to dentures.

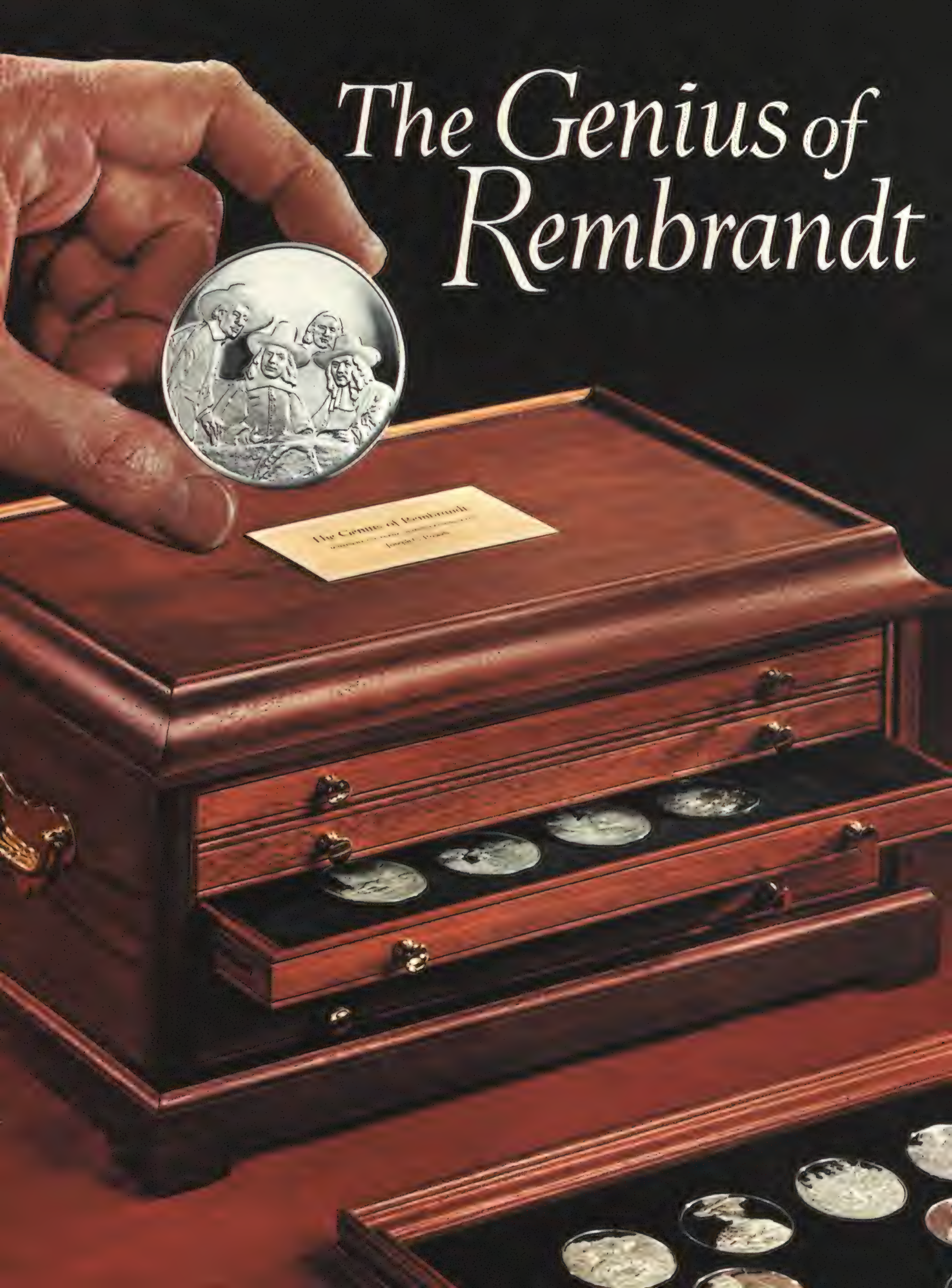
There is no doubt that both the real and recorded profile would have been preserved more true to nature had Washington had the benefit of modern dentistry. But, on the contrary, he may have hesitated to take full advantage of such primitive dental care as existed in his own time. At least once he camouflaged a dental bill (by paying his dentist's hat bill), to keep the record of his dental ills a secret. Even when he did seek dental care, he gave very specific instructions to his staff that this matter "not be made a parade of."

During his Presidency, he must have suffered untold dental discomfort and pain, distractions from the business at hand. He probably did not laugh a lot and his choice of food must have been subject to extreme limitations, especially at official functions.

His artificial dental anatomy must have had a profound influence on his speech. At the very least, he would have kept the pronunciation of long words, especially those with "s" sounds, to a minimum. And certainly he must have been self-conscious in public, for he was continuously faced with the ever-present danger of a humiliating dental disaster. He must have had a deeply concerned look on his face, as well as the pouting lips which he repeatedly asked his dentists to help correct, in vain.

Greenwood's second denture was made of gold and hippo teeth (upper), elephant and hippo, below.

# The Genius of Rembrandt



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*By Dora Jane Hamblin*

# Italy's marvelous marble jigsaw puzzle with 20,000 pieces

*A pile of rubble from a cave may yield four original Greek sculptural groups, but the problem is how to put them together again*

"What we have here," says the young director of the Sperlonga Archaeological Museum, "is not really a museum but a sort of living theater. It's like a happening—every day a true thing becomes false or a false thing true."

Strange words from a museum director, but this is a strange museum. Located on the Tyrrhenian Coast some 65 miles south of Rome, it contains—in various stages of reconstruction—about 20,000 fragments of marble found in a grotto near the once-sleepy fishing village of Sperlonga. Waiting to be pieced together from this gigantic marble jigsaw puzzle are four original Greek sculpture groups carved as early, perhaps, as the second century B.C. They make up one of the most stunning archaeological finds of this century.

Sperlonga's story began on a September morning in 1957, while workmen were hacking out a scenic coastal road between Terracina and Gaeta. The new roadbed followed, in general, the route of the ancient Roman Via Flacca, and ran very close to ruins which were traditionally held to be those of a villa that belonged to the Emperor Tiberius (42 B.C.-A.D. 37). A highway engineer named Erno Bellante, who knew his ancient history, was struck one day by the sight of a natural grotto at the foot of a cliff rising above the white sand beaches of Sperlonga. He took his lunch down there and, scraping around in the sand that had been washed

*The author, who lives in Italy, wrote the article on art thefts in* SMITHSONIAN, *March 1972.*

This is the reconstruction of a group now believed to represent the blinding of the Cyclops. Most

*Photographs by Vittoriano Rastelli*

of the central figure is in plaster and is conjectural,
but marble is added when pieces are found to fit.

into the grotto by tides and storms, found some fragments of white, milky marble.

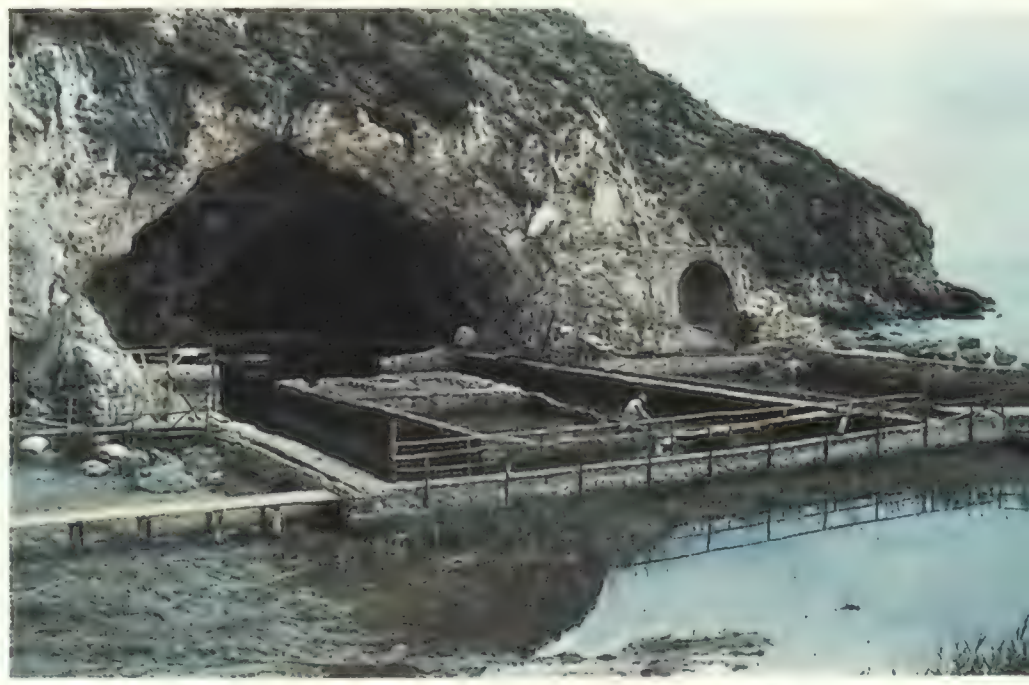
Discreet inquiry revealed that inhabitants of the vicinity had always referred to the cave as "Tiberius' grotto." This could have been mere local legend. But both Suetonius and Tacitus, in their accounts of Tiberius' reign, mention a misadventure in a cave. Tacitus writes: "About this time a danger confronted Tiberius. . . . They were dining in a villa called Spelunca, situated between the sea at Amyclae and the hills of Fundi, inside a natural cave. All of a sudden, the mouth of the cave fell in, stones poured down and crushed some of the attendants; a general panic ensued and the guests fled." (Sperlonga is a corruption of the Latin word for cave, *spelunca*.) Such literary evidence, plus the high quality of the sculptural fragments found there, have since convinced the archaeologists that "Tiberius' grotto" did indeed once belong to that moody emperor.

With all this, one may wonder why it had never been explored. Perhaps it was because, as Bellante's inquiries also brought out, everyone in the neighborhood was of the firm opinion that it was infested with snakes. However that may be, Bellante took part of his work crew to the grotto on succeeding days and they dug up hundreds of marble fragments of fingers, feet and bits of heads.

They reported their find, and handed over the pieces to Professor Giulio Jacopi, then Superintendent of Antiquities for Rome and the province of Latina. Jacopi sent policemen to guard the site from sticky-fingered tourists, diggers to excavate it and trucks to take the precious marbles to Rome. It was at that moment that the discovery first turned into a happening. The trucks were met in Sperlonga by truculent citizens determined to keep this unexpected treasure *in situ*. Boulders, trenches and human bodies blocked the approach along the beach to the mouth of the grotto. Truck drivers, police and archaeologists were pelted with wet sand and small rocks. There was a temporary truce, a parley and finally an agreement: The statues of the grotto of Sperlonga would be reassembled and restored right there, where they had been found, and kept in wooden sheds on the beach until there was time and money to build a proper museum.

The problem then, as it still is, was to figure out not only which fractured fragment should be joined to the next, but also to which of four apparent groups the restored figures belonged. All the figures are representations of heroes and villains of classical mythology. The four groups were tentatively reconstructed one way a decade ago; now they are being totally rearranged. Most experts agree that today's reconstruction approaches a more logical assemblage, but there is no assurance that the groups will remain precisely this way. "Every theory is wrong," says the current museum director, Baldo Conticello, happily, "including some favorite ones of my own."

The first announcement to a fascinated world was that the shattered marbles were perhaps the Greek original of that famous group in the Vatican Museum, the Trojan priest Laocoön and his two sons wrestling with serpents. Professor Jacopi leaned toward this interpretation for several reasons. First, there was an enormous, ten-foot-long marble leg and a right hand of equally heroic proportions (page 59), indicating a gigantic central figure. Then there were two near-life-size torsos, twisted evocatively like those of Laocoön's sons. Finally, there was a marble plaque which stated unequivocally that "Athenodoros son of Hagesandros and Hagesandros son of Paionios and Polydoros son of



"Tiberius' grotto" at Sperlonga; in the foreground are fish tanks to supply the emperor's table.

Polydoros" had "made it." These names were famous in ancient Rome. They were sculptors from the island of Rhodes, and the noted historian Pliny the Elder had once written that he had seen in Rome a great group of Laocoön and his sons which these three men had carved from a single block of marble (although it actually is not).

Almost immediately the Laocoön theory was challenged by Professor Amedeo Maiuri, famed in Italy as the "mayor of Pompeii" for his excavations there. Professor Maiuri admitted that some scaly marble coils dug from the sand might be serpents. But how did that explain such other finds as the marble ribbing of a boat and the head of a man wearing a peculiar conical hat which the Italians call a *pileo,* traditionally associated with Greek sailors? In *his* opinion, said Professor Maiuri with the icy calm of one great authority challenging the interpretation of another great authority, the group must have had something to do with Ulysses—Odysseus to the Greeks—and his lengthy adventures after the Trojan war had ended. Perhaps, he said, the scaly coils belonged to the sea monster Scylla, who devoured six of Ulysses' companions.

The rear figure incorporates a marble torso found in the cave. In front of it is a plaster replica.

*Enough for everybody*

Fortunately for scholarly peace, enough bits and pieces emerged from the grotto, and from the deep sand at its mouth, to provide not only heads and arms and legs for Laocoön and his sons but also for Ulysses and Scylla, and for half a dozen other groups as well. Among the finds were a helmeted head and a strangely bent, dragging foot, which reminded Professor Jacopi so much of the Florentine statue of Patroclus being carried lifeless from a Trojan battlefield that he felt quite certain that he had the Greek original of this group, too.

In addition, there was an exquisite small Pallas Athena held in a brawny masculine hand; a great Zeus-like eagle carrying away the handsome Trojan youth Ganymede; a meltingly beautiful female figure in a toga and stole; and a series of marble discs about two inches thick and a yard in diameter, apparently designed to be dangling, chain-supported mobiles inside the pleasure cave of Emperor Tiberius.

In the autumn of 1963 the new national archaeological museum of Sperlonga opened to the public. On display were fragmentary but striking partial reconstructions of the Laocoön group, of Scylla and her girdle of dogs attacking Ulysses' sailors, of the lovely little Pallas Athena being held up by a magnificent marble man with a beard and conical hat.

That same autumn, Professor Jacopi retired and into his place at Sperlonga came Baldo Conticello, who had always had a sneaking suspicion that maybe Maiuri was right. For one thing, that enormous marble leg was stretched out straight, rather than bent in the posture of the Vatican Laocoön. And the right hand was limp, listless, instead of grappling fiercely with the encircling snakes. This giant, whoever he was, had been inert.

Almost instantly Conticello thought of another episode in the *Odyssey*—not the Scylla, but the time when the giant one-eyed Cyclops Polyphemus shut up Ulysses and his sailors in a grotto-like lair. There the wily sailors got the giant drunk on wine; two of them then made a great torch of burning olive wood and put out the Cyclop's eye as he slept. This would account for the outstretched leg and the limp hand, and it might also fit with some enormous chunks of beard, hair and nose which were lying about in boxes waiting to be identified and put together.

"At this point it was clear that I needed a sculptor, not another archaeologist nor even an expert restorer," says Conticello. "I needed a man with a classical education and a sculptor's instinctive feel for anatomy." He found that man in Vittorio Moriello, 35, a soft-voiced Neapolitan with big, careful hands and tousled hair always full of bits of half-dried plaster. Moriello is a classical scholar, a teacher, a sculptor who has spent all

A partial reconstruction of Ulysses' ship, along with the reclining figure of the helmsman.

Although the top of his head is missing, the helmsman remains a fine piece of Greek sculpture.

of his summers for five years fitting back together the jigsaw puzzle of Sperlonga.

"When I first saw it, I could feel the drama," he says. "I knew I was dealing with something from antiquity which equaled or even surpassed in beauty the Altar of Pergamum itself." That great masterpiece, now in the museum of East Berlin, once stood near the present-day city of Bergama in western Turkey. Dedicated to Zeus, its most notable feature is a deeply sculptured frieze that includes the scene of the blinding of Polyphemus.

Armed with photographs of the altar, plus others of a "late and deformed" but still useful representation of the same scene from a Roman sarcophagus in Catania, Sicily, Moriello began making detailed drawings, incorporating bits that he could recognize among the marbles of Sperlonga, and sketching in the proportions and the general lines he felt the whole group would have taken.

*Using "negative images"*

He made plaster casts of all the big marble pieces, and then he and Conticello worked out an ingenious system of "negative images" for the missing parts. These were concave plaster molds of, say, a hand or a forearm, based on Moriello's best judgment of their relative size and position in relation to the elements of the sculpture group that they already knew.

"This system could only work with classical sculpture which is in the true sense classic, accurate anatomically," he says wryly. "It wouldn't work at all with modern sculpture."

Slowly, as in a half-forgotten ritual dance, the mythical characters of Sperlonga are lining up in another tableau. One highly tensed marble torso, previously believed to have been the son to the right of Laocoön, now fits more logically into the Polyphemus group (pages 54-55). He still stands at the right with one hand raised, but he is now recoiling from the sight instead of struggling with a serpent. Conticello and Moriello believe he is the wine-bearer who did in the Cyclops, and he is cringing at the coup de grace.

The man in the conical hat, who ten years ago was made to hold aloft the little image of Pallas Athena, now stands, agonized, to the left of the dying Polyphemus. He is none other than Ulysses himself, overseeing the job. Pallas Athena at this point stands alone on a pedestal next to the head of Diomedes, who probably in fact held her but whose body has not yet been found. The group of the sea monster Scylla and the sailors has been reconstructed more sketchily, without Ulysses, but with horrifying renditions of dog-lions attacking the helmsman and the crew, and with a most lifelike marble-ribbed ship's prow (left above).

Museum director Conticello believes that only four of the groups in the grotto were Greek: Ulysses and the Cyclops; the sailors and Scylla; the Pallas Athena and the great hand that held it; and the highly fragmentary warrior group tentatively identified by Jacopi as Patroclus and Menelaus.

All the others—the eagle making off with Ganymede, the robed lady, some satyrs and helmeted women and cherubs and the marble mobiles, he believes to be Roman and of a later period. Few of these are actually even displayed in the crowded museum because they are so diminished by the rarity of the Greek finds.

How and when the statues came to Italy and into "Tiberius' grotto" is still a mystery, as is their exact position inside the grotto. Conticello, who was once convinced that the Scylla group had been placed under water to be seen as a sunken ship, admits that he doesn't think so any more. Nor does he think that the three famous Rhodian sculptors went to Italy to do their work. He isn't even sure that the marble is Rhodian. In more innocent days, archaeologists identified the source of marble by studying its color, veining and texture. Nowadays they know that all these can vary within a single quarry, and that only intricate scientific tests can reveal telltale mineral variations. Conticello has submitted samples of Rhodian, Sperlongan and other native Italian marbles to the Institute of Geology of the University of Rome to try to establish the provenance of the marble in the grotto.

The calligraphy of the plaque attributing at least one of the groups to the three Rhodians indicates, in Conticello's opinion, that it must have been made some decades or even centuries later than the work itself. "Greek sculptors often signed the bases of their statues, but then the bases were either thrown away as excess baggage or adapted to other uses," he explains. "This particular 'signature,' which actually fits onto the ship of Ulysses, was more of a tag than a signature. It was added later."

*They were made somewhere else*

As to the dates of the three sculptors themselves, until fairly recently most scholars believed that they lived early in the first century A.D. Professor Jacopi, however, did a complex study of the men and has now dated them back to the second century B.C. Conticello agrees with him fully, although he says "This discussion is still alive." He does believe that the Sperlonga marble is Greek and that its sculptors were Greek (at least those of the four groups), although he thinks they did the work elsewhere before shipping it to Italy.

"From the time of Caesar on," he says, "the Romans were rich and they wanted Greek things. One can just imagine them telling a traveling friend to

Sculptor-restorer Moriello compares his own right hand with the gigantic one found in the grotto.

The size of the Cyclops was projected from only a few fragments: this foot, a leg and the hand above.

'send me a statue; if you can't find an old one, send a new one.' "

Many practical considerations support Conticello's theory that the work was done somewhere in Greece and disassembled for shipment to the expanding Roman culture market. "We find an astonishing amount of *ancient* restoration in these groups," Conticello points out. "After all, they had to load them aboard rather small ships, get them here, unload them at some port like Puteoli [today's Pozzuoli, near Naples] or Ostia [the port of ancient Rome] and then transport them by cart—carts without rubber tires. All that handling!"

Today's restoration efforts are rendered maddeningly difficult by the degree of destruction of the great groups. No mere action of wind, wave or earthquake could have fragmented the marble as it has been found. For example, there is so far no trace whatever of the gigantic torso of Polyphemus, which would have been a piece of marble so huge that it would have been difficult to drag it away. Some suggest that early Christians smashed the "pagan" statues deliberately, or that—like so much antique marble—they were broken up and burned for lime. Nobody knows for sure. The certain fact is that little more than ten percent of the fragments have been pieced back together again, so small and fractured are most of the remains.

The sea has receded several yards since the grotto of Sperlonga was in its glory, but even now the waves and wind wash up new fragments to be added to the heaps on floors, shelves and boxes in the museum. Within the past few months two fishermen came trudging in, hats in hand, to present the director with a lovely fragment that appeared to be two fingers from a hand.

"Moriello, who has a memory of steel," recounts Conticello with awe, "looked at that bit and rushed into the laboratory. He came out with a piece that fitted it. He remembered the *fracture line*. In reverse!"

Fans of Sperlonga, who now number several hundred thousand, put the place on their vacation itineraries every year and stop by to trudge down stout new steps to the echoing, empty grotto, to gaze at the sea and to climb back up to the museum to see which figures are now in which groups. Most of them take one last look at the tumbling white line where the gentle Tyrrhenian surf meets the sand on the beach. Out there, *under* there, is the rest of it. Conticello has pleaded in vain with the Italian navy to lend him dry-dock tanks and pumping equipment to scour the outer mouth of his mine of Greek marbles.

"There are still out there," he says wistfully, "a lot of surprises for the living museum of Sperlonga."

A plaster cast is swung into position. If it fits, it will be replaced with the original marble.

This splendid marble head, with its conical seaman's cap, is believed to be that of Ulysses.

Gaudily embellished with names and street numbers,
a train makes a dazzling stop in Penn Station.

*Text and photographs by William Vandivert*

# Mobile graffiti in New York . . .

*Subway cars from the Bronx to Coney Island are bedizened with garish calligraphy that dismays—or cheers—their passengers*

Graffiti in New York City have become mobile. Subway trains carrying graffiti both inside and out roar from Jamaica to Coney Island, from the Bronx through Harlem to the Rockaways. Some of the exterior graffiti are huge, multicolored designs done with spray-can paint. Others are the quick, nervous signatures of high school students using felt-tipped markers. All are a nonviolent and unusually graphic indication of the uneasiness of the inner city.

New York's subways are run by the Metropolitan Transportation Authority, a state agency. Mayor John Lindsay claims that its losing battle to get rid of the graffiti costs $1.3 million a year. New cars do not look virginal long—graffiti appear on them overnight. The cars then show early wear from scrubbing with strong solvent. But old cars, to some eyes, are improved by the patchwork scrawls. On tiled station walls, clots of noms de plume spring up at express stops where youths riding between cars add quick graffiti, while a friend blocks the sliding doors from closing and subway guards are watching the platform side as passengers step aboard. Authorities have found no finish that is resistant to all marker inks and spray paints. A bill is being introduced into the New York legislature to make it a misdemeanor to manufacture or distribute spray paint that is not soluble.

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New Yorkers are fond of claiming their city is the utter end of everything. One subway rider on the Eighth Avenue line, when asked to marvel at a northbound train resplendent with graffiti, said: "You haven't seen nothin'. Why, the Seventh Avenue is MISERABLE—it's like an ocean of graffiti!" And he smiled with masochistic pride. The Seventh Avenue is indeed the gaudiest line of the MTA. Many cars are old and stations are grimy. The line runs through the Harlem ghetto into one of the most impoverished areas in the Bronx. And the garish colors on the cars liven up the dreary neighborhoods as the trains frequently rumble through.

The rash of painted signatures was begun by "TAKI 183," a made-up name and a street, which blossomed overnight from Harlem to midtown. The act was showy and easy to copy, and provided a release from the pressure cooker of slum life. Curiously, the four-letter obscenities and the racial slurs of a few years ago have largely given place to signatures and an occasional cryptic message—essentially good-humored.

For the kids—most often 12-to-15-year-old boys—who scrawl and paint the cars, the names are part of an ego trip, part of a compulsive show-off and put-on. Talk to them and you find that the big-time graffiti artists have become folk heroes: "You see that name? He got busted and they took him to court. Made him clean up a whole station with steel-wool pads. Now he signs himself 'SPY.'"

After school many Harlem kids hang out in the subways on their way home, clowning and bragging. The areas most heavily laden with graffiti are, of course, the high school stations, where the kids tend to loiter. One may check to see that the coast is clear, then with a giant marker scrawl a practiced and precise signature in 11 seconds—"PLISS 151."

Some subway workers react angrily. One at Times Square, whose nonstop opinion was punctuated only by the grinding roar of incoming and outgoing trains, said: "We got this graffiti problem and vandalism because we've got a weak mayor. He just doesn't have the backbone to clean up this city—let alone the subways. Crack down on the ringleaders! Hit their families' pocketbooks! Get parents down to clean up the subways with their kids. . . . The paint, that's nothing. . . . I've seen cars where the kids have swung on the strap bars and kicked windows out with their feet. How do they get the paint? They steal it. You know they've stolen it by the odd colors they use. . . . This town could be a good place, but we need a government that works."

A slim black in his early 20s moved closer on a subway seat: "I drive a cab part time," he said by way of introduction. "Why, some of the graffiti on this dirty subway livens up my life. Better than those advertising cards they use to brainwash me with. Now I don't pay them any thought."

The real irritation over the new wave of decoration

In the subway yards at 240th Street in the Bronx, parked cars brighten up a drab neighborhood.

comes neither from black nor white alone, but from the older, educated middle class, who regard the scrawls as an attack on the values they still respect. "Vandalism," they mutter.

A Bronx bus dispatcher told me buses get hit too. "Fast—by kids—when we stop for passengers. I've had to take two buses off already when they painted windshields right in front of the driver while he was taking fares. That's one thing they wouldn't dare do on subway trains. Can't make as quick a getaway." So far, the interiors of most buses have been spared.

A subway is a turf where confrontation between lawbreakers and ordinary citizens is a fact of life. People ride the trains quietly with an occasional smoldering glance to break the apathy. But there is fear and violence below the surface. An attractive, young black woman reached into her roomy bag to get a comic book for her child and revealed a revolver. She met my eyes quite coolly. And high school kids in Harlem do their own bragging: "How come you pulled me offa that train just to talk, when me and these other guys was planning a good robbery?"

While I was photographing the scrawled-over tile walls, a kid sidled over. "What you doing, mister? You sure you ain't undercover police?" Subway police are few and far between. In nearly a week of riding the Seventh Avenue line, I saw only one policeman on the route during the daylight hours, aside from those at the big stops, such as Times Square and Penn Station. Maintenance and car yards at the end of the lines are sparsely guarded at night, with the result that stealthy and well-equipped graffiti artists can easily slip in to do their handiwork.

South of 145th Street in the tunnel is one of the yards where local trains lie between rush hours. From stations at both ends of the yard, the kids can get in, either day or night. They stand on the wooden safety covers over the live third rails and paint their signatures. Some are enormous jobs done in two or three colors with spray cans. There is danger of electrocution or arrest, but that is part of the "hero" deal. There is the bravado of a repetitive feat accomplished on the side of one car: "ACE 137-12 times." But the idea is always the same. One car says it clearly. Above a "Turok" signature, two eyes are painted and the word "LOOK" shouts at you. That is exactly what subway riders can't help doing.

One of them, a young man from Italy, sat beside me in a dazzling car and went over his reactions to a year in New York. He said that he had disliked the graffiti at first, then on reflection he saw that they had something of certain accepted modern art forms, incomplete, disorganized, but vital. He had come to appreciate and like the graffiti-decorated subways—this was visceral New York.

Mayor Lindsay, in his campaign to eradicate it all, could try passing around the word that it is modern art. That might kill the whole thing.

Stoic subway riders have plenty to read without looking at the advertising above the seats.

*By David Lampe*

# ... but gigantic graffiti have long been British

*From prehistoric times, 'vandals' with big ideas have scratched outsized figures and symbols wherever chalk underlies the turf of hillsides*

The biggest, oldest, best-known and most beautiful horse in England appears to prance with tremendous vitality over the Berkshire Downs. He stretches 365 feet across a slope known as White Horse Hill, 500 feet above the Vale of the White Horse, at Uffington. Possibly more than 2,000 years old, this figure is an impression—a few curved, unconnected lines. Like some Neolithic cave drawings, which in style and feeling it resembles, it seems to have been intended to suggest and to explain an animal in motion.

People living near Uffington have for at least 900 years spoken of the figure as a horse, but it also has at various times been identified as a tracing of the dragon slain by St. George. Those who stick to the horse theory maintain that the dragon legend is a matter of geographical confusion. England's patron saint really slew that beast on Dragon Hill, not White Horse Hill.

The Uffington White Horse is a drawing, achieved by scraping away some of the hillside's grassy topsoil

White Horse at Uffington, Berkshire, is longer
than a football field and may be older than 2,000 years.

to reveal the solid white chalk beneath it. Remarkable as it is, it is by no means the only remarkable specimen of England's dozens of hill figures.

Some of these tremendous drawings are prehistoric; others were completed only a few years ago. The earliest English hill figures were probably put on the hillsides as signposts to guide pilgrims to the holy places of now-forgotten religions. Most are of gigantic horses—not surprisingly, for early Britons often worshiped horses. Newer hill-figure horses, of course, have no religious significance, although many are on the sites of earlier pagan ones.

Modern hill figures include badges of famous British and Commonwealth military units and of the YMCA, a very large outline map of Australia, a lion, a panda and a kiwi, a royal crown some 240 feet wide, a two-dimensional obelisk and even an airplane. There are several hill-figure crosses; the older ones, some historians guess, were actually phallic symbols to which early Christians added crosspieces. The last things the Pilgrim Fathers could make out clearly on land as they sailed away from Plymouth was a pair of hill-figure giants facing out to sea.

The first hill figures may have been created by artists who noticed on the chalk-based hill range that extends from the White Cliffs of Dover southwestward into Dorset occasional bare patches of chalk or perhaps other rock that looked like familiar objects, animals or people. Possibly these artists then did a little judicious scraping here and there to improve these natural "pictures."

Those interested in hill figures study every new archaeological clue to their possible origins. Uffington's horse, for example, looks a little like the horses that decorate some Iron Age coins and Celtic buckets found nearby. Yet it looks much more like two chariot

*David Lampe wrote about the "follies" of Britain in* SMITHSONIAN, *November 1971. He does his free-lance writing at his farm in Herefordshire*

*Photographs by Terence Spencer*

horses engraved on the wall of a tomb in Kivik, Sweden, dating from the seventh century.

Existing historical records concerning early hill figures are inexact and often fragmentary. Radiological dating techniques would shed no clues, either, for the repeated restoration that keeps the figures from fading back into the earth must be done by replacing the figures' actual substance. The fact that the Uffington White Horse, like many of the apparently older hill figures, happens to lie close to an ancient earthwork enclosure and a prehistoric flint mine is interesting—but there is no positive way to be sure that the horse is the same age as these things which can be dated.

Where no verifiable records exist, where the hill figures look like nothing anybody has noticed anywhere else, dating is sometimes inhibited by the fact that neighboring people take them so much for granted that they usually know or care little about them. Thus no legends are passed down. Just before World War II, researchers looking for an overgrown hill figure in Wiltshire, one recorded as having been visible less than 50 years earlier, could find no one around who had even heard of it.

It's also only possible to guess how the older hill figures were drawn. But since the late 18th century, turf artists have usually started with scale drawings from which they paced out the figures. Many, even ancient ones, were elongated intentionally to keep them from appearing foreshortened. The artist watched the work from far off, and using either runners or hand signals, directed the laying out of the figure on the ground. When Dr. Christopher Alsop, a physician from Calne, Wiltshire, put a nearly 140-foot-long horse on Marlborough Down in 1780 to replace a vanished one that he had heard about, he yelled his instructions to his markers through a megaphone from a summit called Labor-in-Vain Hill, fully a mile from his white-chalk horse. Alsop became known in Calne as "the Mad Doctor," but his horse figure was imitated at least eight times on other hillsides in his corner of Wiltshire.

One of these imitations, five miles from Calne, was the work of "Jack the Painter" Thorne, an itinerant artist who was paid £20 by the local farming squire to produce it. Jack pocketed the princely sum, hired a man from a nearby village to do the actual cutting, then before the work had been completed, disappeared without paying for it. Thorne was reportedly arrested later and hanged for counterfeiting.

According to legend, the laird responsible for the one hill-figure white horse in Scotland—a 126-foot-high animal carved c. 1775—died of frustration. Apparently, he seethed over his inability to get the shape of the horse right. From a distance it always appeared bandy-legged.

Most hill figures of modern times have been produced by variations of the flag-and-megaphone method, but not all of them. The creators of the 240-foot-

Whipsnade Lion, 500 feet from head to tail, was carved in the turf in 1935 to mark the nearby zoo.

Crosses such as this may have been latter-day conversions of pagan phallic symbols.

wide crown in Kent, an instructor and some pupils at a local agricultural college, began by making a tracing of the crown on the reverse of an 1887 two-shilling coin which they then carefully cut out and mounted on the object lens of a surveyor's theodolite. The instrument pointed at the hillside; the instructor peered through it and used hand signals to direct the students marking out the crown with white flags.

England's 323-foot-high, 260-foot-long equestrian figure, the Osmington Horse, three miles west of the seaside resort of Weymouth, was apparently produced by soldier artists to honor King George III, its rider, who for many years had vacationed at Weymouth. The horse is riding away from the town rather than toward it—a fact which, according to the town's pre-World War II guidebook, so annoyed His Majesty that he never visited Weymouth again.

Successive generations of Weymouth people have believed that the rider on their chalk horse figure was not really King George III at all. They opted first for the Duke of Wellington and then, much later, for Lord Kitchener.

Hill figures are often within sight of each other, but only on Fovant Down, on Wiltshire's Salisbury Plain, are they lined up in a tight row. In 1916 the plain was a vast military encampment. To pass the time some members of the London Rifle Brigade volunteered to emblazon a 150-foot-high replica of their regimental badge on the hillside overlooking Fovant village. The hillside happened to be the backstop of several rifle ranges, so the soldiers had to do their turf-cutting between four and seven in the morning. After that, firing commenced. Their badge took a whole three months to complete. But it was immensely impressive.

Soon the whole line of hills became decorated with military emblems, Australian as well as English. Someone also added the seal of the Young Men's Christian Association, which in those days ran most of the service centers in Britain.

Some miles away, on Salisbury Plain's Beacon Hill, the Royal New Zealand Engineers laid out and had cut the silhouette of their nation's national bird, the kiwi, during World War I. It is 420-feet long, has a 150-foot beak, and altogether covers an acre and a half of downland.

Several other hill-figure animals have been made in Britain since then, among them, in 1937, yet another white horse. The 1935 lion at Whipsnade Zoo, 30 miles northwest of London, is even larger than the kiwi—nearly 500 feet long. The walk around its perimeter is three-quarters of a mile. Besides guiding tourists to the zoo, the lion serves as an effective warning to glider pilots from nearby Dunstable Airport not to land in the wild-animal enclosures.

The only English hill figure that represents a 20th-century man-made object is the airplane in a meadow below the northern side of Dover Castle. It was put there in 1909 to commemorate Blériot's cross-Channel flight, and it is the same size as his aircraft.

The Blériot is picked out in concrete, and so it will last indefinitely without care. Most chalk figures that have disappeared have done so because nobody kept them free of weeds. Many of the older ones have survived because their "scouring" became a ritual. Most were thoroughly scoured once every seven years, and presumably looked after in between.

In some places scourings were occasions for carnivals. The two-day scouring at Uffington was known locally as the "Pastime." It was made the subject of a popular novel of 1857, *The Scouring of the White Horse,* by Thomas Hughes, the Uffington-born author of *Tom Brown's School Days.*

Often scourings are paid for by local landowners, though many have been financed by voluntary contributions of schoolchildren, Boy Scouts and various

Mighty hand of the Cerne Abbas Giant lies on a green hillside in Dorset. He's 180 feet tall.

Blériot's airplane, now etched in concrete, honors his 1909 flight across the English Channel.

adult groups. Between the two World Wars, the Salisbury Plain kiwi was maintained by a local man who was paid by the shoe polish company whose trademark the hill figure resembles. Every six months a shoe polish salesman dropped by to see that everything was tidy around the unofficial trademark.

Most massive hill-figure scourings occurred after World War II. At its outbreak Britons had become panicky about leaving anything visible that would guide German planes. Since many hill figures are marked on aerial navigation maps, the most conspicuous ones had to be hidden under camouflage netting or turf. Some were sloshed with green paint, and a number, including the Fovant badges and the Weymouth equestrian figure were simply allowed to become overgrown. Under the aegis of the Air Ministry all sorts of groups helped in the postwar uncovering of the figures.

Some of the military badges on Fovant Down could not be found, however. Today a local trust helps raise money to preserve these hill figures, and a weed-killer manufacturer provides free herbicide. In 1970, men of the Royal Army Corps of Signals, after scouring the nine remaining World War I badges, added a tenth, their own.

An early scouring restored to full grandeur the Long Man of Wilmington (p. 71), lying on his back on Windover Hill, 59 miles southeast of London. He already appeared timeworn in 1779, when the oldest known description of him was written, and for many years he was neglected and was visible only when the sun was low. The historian who had him cleansed was convinced he was a sacrificial figure of the Gauls. He has also been identified as Beowulf, as Thor, Apollo, Mercury, a Roman centurion, an ancient British surveyor, St. Paul and Muhammad.

He could be as old as the Uffington White Horse, but probably he isn't. At first description, the rods that he holds were thought to represent a Saxon rake and scythe. Today, some archaeologists suggest that these "staves" are the edges of a pair of doors and that the Long Man himself is the Hindu god Varuna, opening the gates of heaven. This theory was first advanced in 1926 by Sir Flinders Petrie, famed for his work in Biblical archaeology, who, despite the absence of tangible evidence, believed that Varuna cultists visited Britain in the first millenium before Christ.

The Long Man of Wilmington is the tallest man in England, measuring 231 feet six inches from head to toe. The Cerne Abbas Giant is far shorter—only 180 feet tall, and probably younger—about 1,800 years old, according to consensus. But he earns his own fame by being England's most outrageous hill figure. He was probably a Romano-British Hercules, and he is very nude, aggressively masculine and explicitly drawn. He wields a knobby, most un-English war club 120 feet long. These facts, and the midsummer maypole celebration that until 1635 had always been held high on the hill above him, suggest that he must have been a god of fertility.

The people of the very pretty little Dorset Village of Cerne Abbas, at the giant's feet, know that some of their ancestors believed that he was the tracing of a real giant who used to eat maidens and who was killed by the villagers while he napped on the hillside. The two-foot-wide trench that was cut around him and filled with chalk, the legend says, was intended to preserve his form. Many still believe that any woman who sleeps on the giant will bear a large family, and childless couples still occasionally visit Cerne Abbas to pray in the local church and then go into the churchyard, turn their backs to the giant while they make a cup from a laurel leaf, and start wishing.

The villagers have always been very proud of their giant and for centuries kept him well scoured. Even in Victorian times they never considered letting weeds clothe him. In 1920 he was presented to the National Trust, custodian of much that is the substance of Britain's heritage.

He does attract vandals. Three years ago the Dorsetshire agent for the National Trust had to move in a team of workmen with tons of fresh chalk to do a blitz cleanup. In the dark, someone had entered his enclosure and had set to work with green paint—so that at sunrise Cerne Abbas possessed a giantess.

Long Man of Wilmington, England's tallest man,
dwarfs the live figures beneath his hillside.
He stands 231 feet six inches from head to toe, but
little is known of his origin in the dim past.

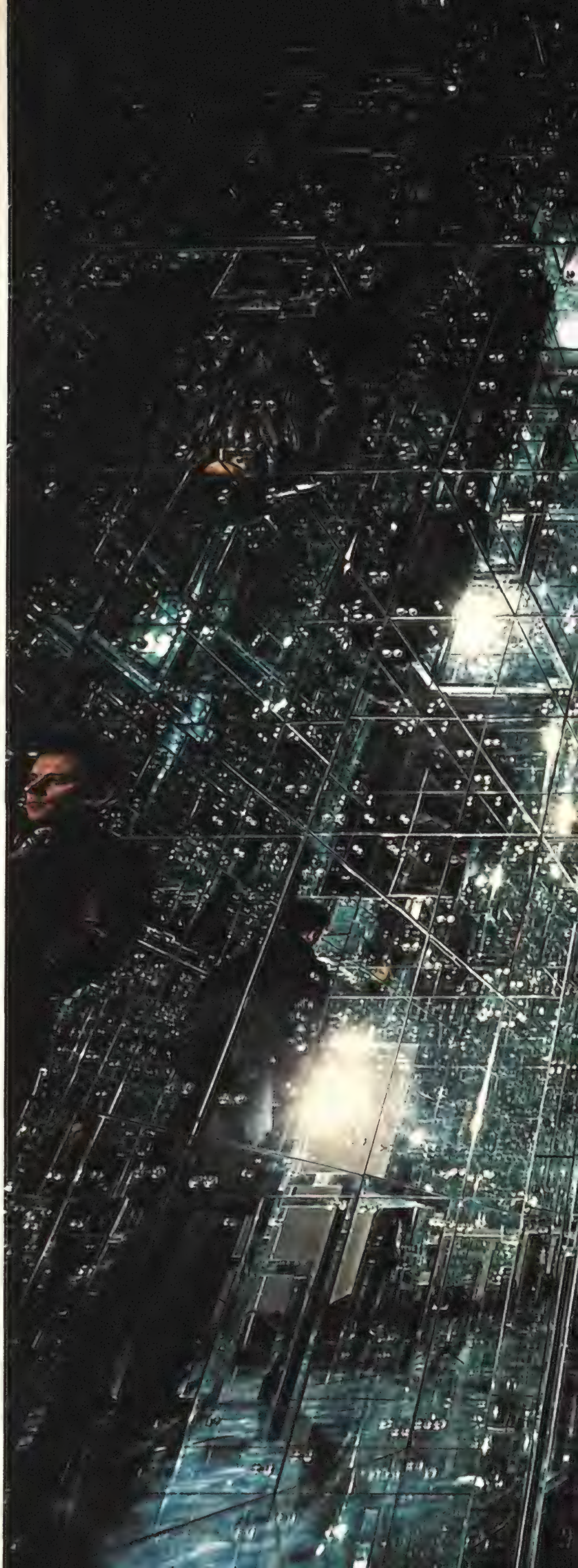
*Photographs by Yale Joel*

# A reflective artist takes a peculiar slant on the world

*Nothing is too daffy for the New York artist Lucas Samaras, who turns out mirrored environments, boxes and weird eyeglasses*

Anyone who has set foot in an old-fashioned barber shop is familiar with the ego-gratifying spectacle of seeing himself reflected to infinity. Now this optical illusion has been brought to a dazzling—and dizzying—third dimension in a completely mirrored room, an environmental sculpture in the form of a walk-in cube that is titled simply *Mirror Room*. The eight-by-ten-by-eight-foot room, which is mirrored on the outside as well, is the work of Lucas Samaras (opposite in his own creation), a 36-year-old New York artist whose work was shown in a retrospective exhibition at the Whitney Museum in New York. *Mirror Room* was commercially fabricated in 1966 following the designs of the artist, and it is now in the collection of the Albright-Knox Art Gallery in Buffalo, New York.

*Mirror Room* was the most popular attraction in the show. It was also the largest and most streamlined object in an exhibition otherwise filled with small, often bizarrely embellished assemblages, composed of such seductive and/or threatening materials as colored yarn, stuffed birds, sparkling crystals, tacks, pins, razor blades, mirrors, X rays of hands and heads, and photographic portraits of the artist himself. For all their attractiveness, a great many of the works look



Samaras stands behind a mirrored, but functionless, table and chair, the sole furnishings of his *Mirror Room*, a walk-in sculpture constructed in 1966.

A plastic case, containing two tiers of fanciful but unusable eyeglasses (above, opposite) displays Samaras' ingenuity in treating a single theme in a variety of most unlikely forms and materials.

distinctly menacing, while some have erotic overtones.

"I find high erotic content," Samaras has written, "in things iridescent, sparkling, fragile, sharp, oily, hairy, pimply, fluffy, dendritic, elastic, pulsating. I love mirrors, shadows, vortexes, lightning, razzle-dazzle, twistedness and nausea but . . . with control."

Although Samaras is an established artist whose work has been included in many major museum shows and is, in fact, owned by several museums, he is still a controversial figure. And the critical response to his retrospective was mixed. Barbara Rose, writing in *New York,* seemed pleased: "The world of Samaras is a world of metamorphoses, in which everything turns into something it should not be, taboos are deliberately broken, the sacred is profaned and privacy is out of the question."

But *The Village Voice* art critic, John Perreault, complained: "For work that sets out to be imaginative, the results of Samaras' obsessions turn out to be not quite imaginative enough. They titillate and in a glittery way they please. In short, like a great deal of the late Surrealism that Samaras is so heavily indebted to, his works are chic and more than a bit fussy."

Samaras' flair for metamorphosis—and titillating chic—is clearly apparent in his series of variations on a particular subject, rendering it in a number of different shapes and materials. He calls these series "transformations," maintaining that "my transformations negate the possibility of a single Platonic ideal acting as measure for any physical thing; instead many different ways of physically depicting a thing are selected and shown."

Inasmuch as Samaras views his world from such a peculiar slant, it is somehow appropriate that he would make a work called *Transformation: Eyeglasses* (left and opposite). Within a Plexiglas vitrine, he displays 20 nonfunctional and wildly improbable spectacles: eyeglasses with knotted lenses, eyeglasses with crinkled frames, and eyeglasses for people with two pairs of eyes. He also has made a series of transformations on such subjects as knives, scissors and, most impressively, chairs—which come in pins, wool, mirror, foil, wire mesh and paper.

Samaras was born in Greece, in the Macedonian town of Kastoria, in 1936. He grew up amid the violence of World War II and the Greek civil war. The house he lived in was invaded by both German and Italian troops and eventually bombed, which resulted in the fatal wounding of his grandmother. In 1948 he moved with his family to New Jersey, where he attended Rutgers University. "Since I didn't know the language," he says, "the easiest subject for me was art, where I didn't have to know English."

During the late Fifties and early Sixties, Samaras became a familiar face in the avant-garde art world as

Left and right: Albert A. List Family Collection

he performed in many of the happenings devised by Allan Kaprow, Robert Whitman and Claes Oldenburg. He participated largely because he wanted to be a real actor and the happenings provided him an opportunity to perform. In addition, he studied acting at Stella Adler's school. His interest in role-playing is evident in everyday life. While maintaining an eloquent silence most of the time he is in public, Samaras presents a surly facade. When he does talk, he seems to delight in antagonizing or shocking people. In person, as in his art, he often strains too hard to startle.

In the early Sixties, Samaras made hostile-looking assemblages, incorporating pins, razor blades, knives or forks, that make viewers want to keep their hands off. But Samaras is probably best known and most widely admired for his box constructions, which he has made in such profusion that, in 1962, he began titling them with numbers. As a sculptural format, the box has attracted many 20th-century artists, most notably Joseph Cornell, the influential New York artist who has, for decades, produced his enchanting glass-faced box constructions containing bits of ephemera.

*A multiplicity of compartments*

Unlike Cornell, Samaras became interested in boxes when he realized he could cover the *exterior* with something. "My first couple of boxes were painted black or silver, but when I started covering them with pins, wool, jewels, I subverted their geometry—buried it—and gave myself an opportunity to use and introduce ordinary yet strange substances."

Although in the beginning Samaras outfitted a few secondhand boxes, most of his boxes are made to order. The exteriors are often embellished with colored yarn, glued down in rows to create abstract patterns, or encrusted with colored crystals, or rows of thumbtacks or pins. The surfaces are treated in a way that suggests the artist suffered some sort of *horror vacui* that compelled him to fill in every available space. The interiors of the boxes are filled with a multiplicity of compartments, drawers, recesses, each of which may be filled with pencils, shells, sea horses, and perhaps more tacks, pins and crystals, and even a stuffed bird or two. His boxes range from the relatively simple, such as *#64* (page 76), a pin-and-cotton-covered affair containing only a few transparent balls, to the relatively baroque, such as *#74* (page 76), in which the wooden box is surrounded by a Medusa-like filigree.

Samaras believes the box is just "as important a form as the rest of the art forms." But, he complains, "The professional scribblers"—*i.e.*, the art critics—"were not willing to consider it as mainstream art. I stubbornly persisted in waiting for new verbal criteria to be formulated. I'm waiting still."

Some of the eyeglasses in this 1966 work have frames that do not correspond to any known human head. Others have "lenses" that are opaque. A few of the eyeglasses are completely flattened.

In addition to being a full-time sculptor and would-be actor, Samaras likes to write—which gives him an excuse to design his own books. His first tome, titled *Book,* was published in 1968. It contains six stories. Its chief interest, however, is in its design and layout. The book has an irregular-shaped right edge and is pierced straight through with three irregular holes, somewhat like those found in Swiss cheese. Although the ten-by-ten-inch book has only nine spreads, it is full of surprises in the form of foldouts and smaller books. Printed in 98 colors, the book required five production techniques: silk-screening, offset printing, embossing, thermography and die-cutting. A *livre de luxe* by all means, it was put out in an edition of 100, at $1,200 a copy.

But Samaras' best book is the *Samaras Album* (1971). This contains autobiographical writings, two autointerviews and more than 400 Polaroid self-portraits. Most of the photographs show Samaras in the nude or bewigged as a transvestite, or shrouded in a sheet or mugging at the camera. In some of the photographs, he employs trick perspectives and colored lighting to get startling images, such as a giant green foot in the foreground with a red-orange body in the background. There are several double exposures in which the images of Samaras make love to each other.

Strangely enough, there is little that is narcissistic about the *Mirror Room,* because its echoing geometry is so cool and impersonal that, even as it multiplies one's image, it discourages any inclination to identify with it. As Samaras discovered: "Narcissism was there in this lonely crystalline space, but not to the degree that it was expected. The geometry, the abstractness, the shafts and splinters of light had the edge over the echoing bodies."

Few of Samaras' works are as obvious in their sexual overtones as his untitled sculpture in the shape of a tennis racket (opposite), which has a perversely twisted, pin-covered handle doubling back on itself to penetrate the yarn-strung aperture. A rather hermaphroditic object to begin with, the "tennis racket" seems impelled on consummating a most ingenious act, hitherto unknown in the annals of sport.

Still, as Samaras observed about his own occupation: "To be an artist is to be god, and I don't know anything more erotic than that."

Collection Mr. and Mrs. Nathaniel R. Kaplan

Box *#74,* a 15-inch-high wooden work of 1968, has a small container surrounded by eccentric scrollwork.

Collection Mrs. Christophe Castro-Cid

Transparent balls are nestled on pin-studded cotton in *Box #64,* which the artist made in 1967.

Samaras peers through a 1965 sculpture in the shape of a curved tennis racket, trimmed with yarn and pins.

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# *Book reviews*

*Crimsoned Prairie*
S.L.A. Marshall
(Scribner's, $8.95)

General "Slam" Marshall earned renown as a military historian by sticking to the wars he knows. Either he fought in them personally or he knew men who did. What, then, qualifies him to write about the wars with the Plains Indians in the last half of the 19th century (see also page 88)? In his foreword he admits that even he is not *that* old.

He suggests, however, that his interest is both genetic and environmental. He has Indian blood in his veins, and in the early 1920s he rode with the Seventh Cavalry and heard tales of a previous commander, George A. Custer. Whatever his reasons, Marshall ventures into non-contemporary history successfully.

He has studied the western battlegrounds with a scholar's ken and reads their stories fluently. You picture clearly Fort Kearny and its surrounding hills where Fetterman's troops were wiped out and where Powell's, from behind their wagon boxes, held off 1,500 Sioux. The author also knows universal army types—Carrington, careful and gentle; Chivington, a blustering butcher given to conducting his own My Lais; Fetterman, the fire-eater and fool. And on the other side, Red Cloud, a clever tactician who gave up war and advised his braves to adopt the white man's ethic: "You must begin anew and put away the wisdom of your fathers. You must lay up food and forget the hungry. When your house is built, your storeroom filled, then look around for a neighbor whom you can take advantage of and seize all he has."

As for Custer, the author makes fresh sense out of the oft-told tale. Along with many reasons for the disaster, he presents a rather appealing one: Some of that battle madness he attributes—as only an old soldier could—to the flush of June in Montana when the sun warmed the mountain meadows and blossoms hung along the Little Bighorn. These things, the general says, lift the hearts of troops into a never-world of quick decision, joyous action and, in this case, incredible catastrophe.

Throughout this absorbing work, Marshall points out similarities, again and again, between today's business in Southeast Asia and the brutal, unneeded bloodbaths of a century ago that crimsoned our prairies.

—*Edwards Park*
SMITHSONIAN Board of Editors

*Find a Falling Star*
Harvey H. Nininger
(Paul S. Eriksson, $8.95)

This is the autobiographical story of an enterprising biology teacher who in 1923 became intrigued by meteorites, and who eventually transformed a stimulating hobby into a rewarding enterprise. Rewarding both scientifically and financially: His meteorite collection was sold, one-fifth going to the British Museum in 1958 for $140,000, and the remainder going to Arizona State University in 1960 for a considerably larger sum.

Harvey H. Nininger is "Mr. Meteorite" to two generations of people in his area and to many beyond. He has certainly done more than any other individual to educate the public about meteorites—by his lectures, his writings, his personal contacts and, probably most of all, by his operation of the American Meteorite Museum in Arizona, first at Meteor Crater from 1946 to 1953, and then at Sedona from 1953 to 1960. Now in his 86th year, he is still active.

It is appropriate that he has written this book of personal reminiscences, which provides an interesting and informative account of a long life's work. While autobiographical, it is selective, a bit repetitious in parts and incomplete in others. I noted the practical omission of any account of the 1948 fall in Norton County, Kansas, and the resulting conflict between Dr. Nininger and Dr. Lincoln LaPaz of the University of New Mexico. How-

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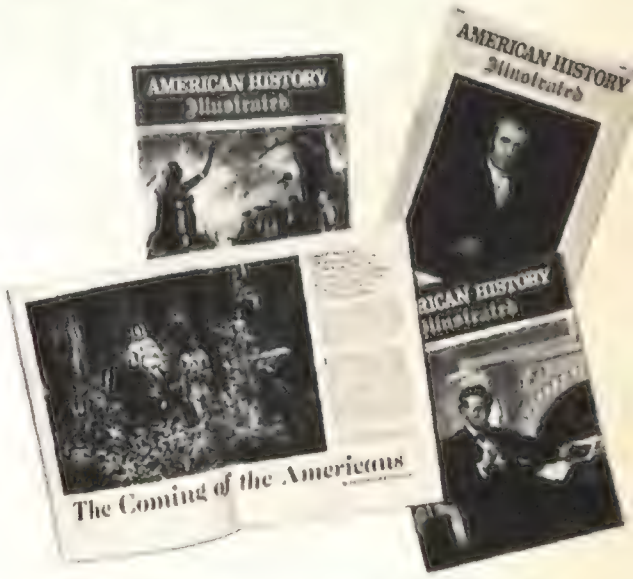


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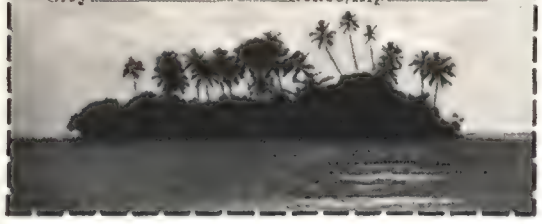

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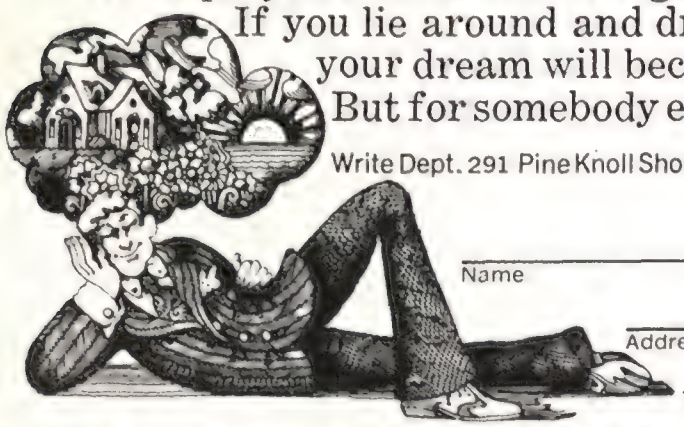

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ever, it is perhaps the privilege of an author to be selective in his reminiscences.

One of the most interesting sections of the book is the account of his work around Meteor Crater. This also resulted in a highly significant discovery. Through polishing and etching many meteorite specimens from the crater, Dr. Nininger noted important structural differences between the irons found on the crater rim and those from the surrounding area. Rim specimens showed evidence of severe shock, whereas other specimens did not; he observed that diamonds were found only in rim specimens, and theorized that the diamonds were formed at the moment of impact, not in the meteorite parent body. This theory has since been confirmed by extensive research.

Another of Dr. Nininger's theories, highly original at the time, has not fared so well. In 1943 he proposed that tektites (small glassy objects, possibly meteoritic in origin) were fragments of lunar rocks projected into Earth-impacting orbits by meteorite impact. However, the Apollo collections have shown that lunar compositions do not resemble those of tektites, and the origin of these curious objects is still an enigma.

The book does contain a few factual errors and misleading statements. The Melrose, New Mexico, chondrite is described as "a stony meteorite containing bits of gold." Lest enthusiastic amateurs be stimulated to crush and pan meteorites for free gold, I would point out that the gold was found, by chemical analysis, in a concentration of less than one part per million! Some of the definitions in the glossary, such as "chondrule" and "octahedrite," are inadequate. However, these are minor blemishes.

Dr. Nininger is somewhat critical of the poor record of geologists in the finding and recovery of meteorites. His own success rests not so much on direct discovery but on alerting local residents in favorable areas and providing them with an economic incentive. I noted that of 2,000 specimens sent to him for inspection only two were meteorites; my own experience as a museum curator is similar. Meteorites are rare and hard to find, and personal search on the ground is rarely rewarding unless some clue has been obtained from local residents.

This is an interesting and stimulating book by an acknowledged expert in this rather "far-out" field and is a fitting mon-

ument to a unique personal endeavor.
*—Brian Mason*
Department of Mineral Sciences,
National Museum of Natural History

*The Great Gamble*
Dudley Pope
(Simon and Schuster, $12.50)

At one time or another most of England's Atlantic seaboard neighbors have felt the weight of her naval might. Although Britain no longer rules the waves, glorious memories remain of victories over the fleets of Spain, Holland, France and, more recently, Germany. On the other hand, English relations with Denmark have been good, with rare exceptions, since 1017, when Canute the Great, King of Denmark, became King of England as well. Dudley Pope, "a Briton who has a great love for Denmark," has written a fine description of one of those rare breaks in English-Danish accord.

The Battle of Copenhagen, fought on April 2, 1801, was won by the English and more exactly by Vice-Admiral Horatio Nelson. Copenhagen was a well-timed victory for England: Her fortunes were at low ebb in this last of her great struggles with France, for England alone confronted Napoleon.

Since 1780, Russia, Prussia, Sweden and Denmark had joined in the League of Armed Neutrality. The League had never actively fought against Britain's blockade of France but, by 1800, with the Napoleonic Wars already in their seventh year, the British felt the League's threat was very real. Thus, when Russia broke with Britain and Denmark joined Russia, Sir John Jervis, First Lord of the Admiralty, ordered a fleet assembled under Sir Hyde Parker.

Nelson, recently returned from Naples and his long dalliance there with Emma Hamilton, was second in command. Parker, 61, had recently married an 18-year-old girl (known in the fleet as his "batter pudding"). His indecision, his delays, drove Nelson half wild.

Parker wanted to sail to Copenhagen and negotiate before resorting to military action. Nelson wanted to leave a detachment at Copenhagen to bottle up the Danes, and then attack the Russian fleet. Thus the League would crumble and Denmark would perforce join Britain.

Eventually Parker bowed to Nelson's persuasion but insisted that the Danes

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could not be left unhurt in the British rear. Nelson agreed to offer the Danes a choice: Join the British against Russia or suffer the consequences.

The Danish reply was unsatisfactory and several days later the British fleet, split in two divisions, moved to the attack. The Danes fought bravely from their anchored ships, floating batteries and fortress. During the height of the battle, Nelson received a signal from Parker ordering the fleet to disengage and withdraw. (Much controversy has simmered over this. Pope lays it to rest in an appendix.) When Nelson was told of the signal, he did not repeat it to his own ships, and kept the Close Action signal flying. Putting his telescope to his blind eye, he exclaimed to his captain, "You know, Foley, I have only one eye—and I have a right to be blind sometimes. I really do not see the signal!"

Of course, to attempt to withdraw badly damaged ships through shoal waters while under heavy fire would have invited disaster. Obviously the Admiralty approved of Nelson's disobedience; he replaced Parker in his Baltic command.

In retrospect, the battle was an avoidable tragedy. Had Nelson's original plan to attack the Russian fleet been followed, the British would have learned that a new czar, inclined toward friendship with England, had succeeded to the throne.

Dudley Pope's treatment of this complicated subject is exhaustive. The text is interlaced with extracts from contemporary journals, letters and other documents, including much new material from the Danish side. The author has sailed the waters that caused Sir Hyde such anxiety and recognizes the fine seamanship required to take large ships (with no engines) through the narrows.

Of Nelson himself, Pope has provided a balanced study: weaknesses, strengths, the unique ability to infuse energy and daring in others. As for Nelson's relationship with Lady Hamilton, Pope argues convincingly that Sir William Hamilton regarded the liaison with equanimity—he was fond of Nelson himself.

*—Alexis Doster III*
Assistant Curator, National Air and Space Museum, student of naval history

*Yankee Stadium*
Joseph Durso
(Houghton Mifflin, $15)

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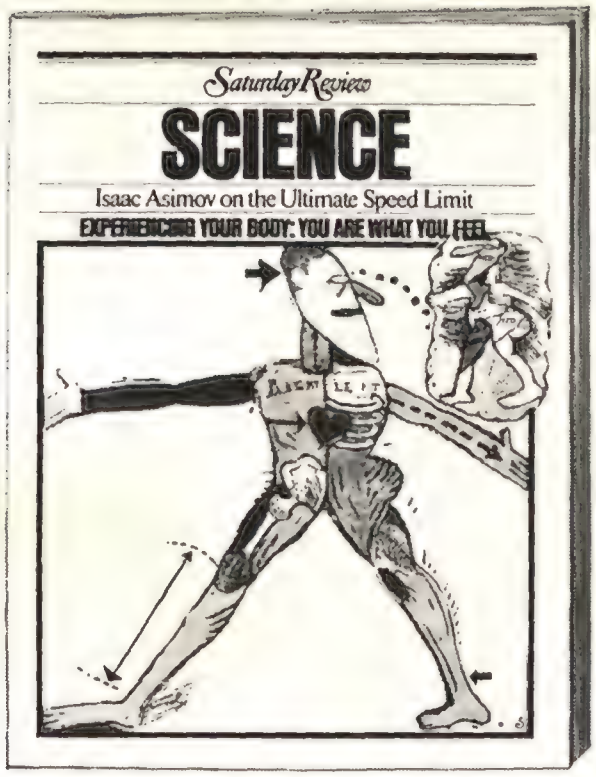


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*Russian Museum Tour:* Moscow, Leningrad, Samarkand, Tashkent and Siberia are the places visited in this three-week tour of Russia's cultural institutions—May 31-June 22.

*African Safari:* Tanzania and Kenya game parks, plus the Seychelles in the Indian Ocean—July 17-August 7 (waiting list only).

*Mexico and Guatemala:* A visit to historical sites of Yucatán, Oaxaca, Mexico City, Tikal and Antigua (depart from and return to Miami)—August 27-September 14.

*Aerospace Museums:* Visits to these special museums in Munich, Lucerne, Moscow and London—September 17-October 3.

*Sites of Civilization:* Three-week cruise from Athens to Rome (depart from and return to New York by air)—October 6-28 (waiting list closed).

**Domestic Study Tours**

For information: Mrs. Patricia Kilkenny, Room 106 SI, Smithsonian Institution, Washington, D.C. 20560.

*Migratory Birds of North Carolina:* An opportunity for amateur ornithologists to observe waterfowl at Mattamuskeet Wildlife Refuge—February 22-27.

*Big Bend National Park:* Exploration of southwest Texas, from the desert, canyons and mountains of Big Bend National Park to a trip across the Rio Grande River—March 11-17.

*Family Weekend:* Participate in field trips and other activities in and around the Smithsonian, designed and priced for family participation—April 13-15.

*Folkcraft and Musical Instrument Makers:* Visit traditional craftsmen; meet the makers of dulcimers, fiddles and zithers in Kentucky, North Carolina and Virginia and study their skills—April 23-29.

*Skin Diving on the Santa Maria Site:* Skin dive at the site and explore Cap-Haïtien and the surrounding areas—May 13-23.

*Vanishing Indian Crafts:* Southwestern tribes demonstrate their ancestral crafts and how they are keeping them alive—May.

*Olympic National Park:* An introduction to Washington's coastline, mountains, lakes and rain forests—July.

*Alaska Float Trip:* Starting at Anchorage, join in a six-day float trip down the Copper River, followed by an extended cruise through Prince William Sound—July 18-August 1.

Arantes do Nascimento and George Herman Ruth share in common? A building? No, it's more of a pantheon to myriad heroes whose glories blended together to form a half-century-old microcosm of American life.

Yankee Stadium was home—ephemerally or permanently—to a vast horde of fighters, announcers, gridiron stars, soccer players, baseball heroes and religious leaders, all of whom came to the oval-shaped steel-and-concrete structure at the first subway stop in the Bronx.

Not content merely with reporting the facts of who did what to whom when, *New York Times* sportswriter Joseph Durso has penned a diverting pastiche of modern American leisure history, pegged to the events inside the stadium but also underscoring their importance to the millions outside. Also, *Yankee Stadium* helps recall Yogi Berra's folk wisdom, Joe Louis' greatness, Pope Paul's sense of history, Lou Gehrig's courage.

The Durso commentary offers passing references to baseball as big business, the news of the day as it appeared on April 18, 1923—when the stadium first opened—and the adaptability of the "house that Ruth built" to a host of activities, from boxing to papal blessings.

Durso's lively text is supplemented by more than 150 rather routine photographs, culled from stadium history. It is here that the reader views some fans, the equipment managers and groundskeepers, and muses anew about the great and not-so-great who made their presence felt in box seats and bleachers.

As the stadium undergoes refurbishment and the Yankees change in ownership this year, the past may not be prologue, but the final chapter is still far away.

*—Michael J. Bandler*
Free-lance literary commentator

*Land Above the Trees, A Guide to American Alpine Tundra*
Ann H. Zwinger and Beatrice E. Willard
(Harper & Row, $15)

While books have been written about the Alps and other alpine tundra areas, this is the first comprehensive book on the American alpine tundra for both novice and scientist.

It is obvious that the two authors, an alpine ecologist and a writer-artist, are fervently marching to the beat of the same drum—the fascination and love for

the exciting and beautiful, but sometimes dangerous, alpine tundra. This reviewer, who admits to being a tundraphile, soon found himself in step with the authors.

It is a revelation to open a technically sound book that is written in clear, rich prose, and is beautifully illustrated with accurate sketches and brilliant color photographs. That the subject has stirred the emotions of the authors is evident in even such a small sample as the descriptions that follow: "The alpine tundra is a land of contrast and incredible intensity, where the sky is the size of forever and the flowers the size of a millisecond. There are no trees to put one's arms around, against which to measure one's height. . . . The only objects larger than small are boulders. . . .The clarity of light confuses one's sense of scale. . . . It bathes the mountains and creates a dazzling luculent landscape. . . . The great wash of light illuminating the alpine tundra gives one a sense of encompassing comprehension verging on euphoria."

The alpine tundra of the United States, especially that of the western mountains, is discussed in detail. The book describes the environment and ecosystems, and the plant and animal communities. The complex processes of formation of frost hummocks, patterned ground, polygons and needle ice are clearly explained. The harsh environment is presented together with the unique adaptations that enable alpine plants and animals to live at the border of existence. The beautiful miniature plants with intensely colored flowers are treated with enthusiasm and care. It is paradoxical that these delicate plants survive one of the most severe climates known, including cold, drying winds, extremely low temperatures, intense ultraviolet light, and a short growing season.

The authors emphasize that the alpine tundra is an environment highly sensitive to the activities of man. Trampling by human feet and vehicles and grazing by domesticated animals can destroy—in a few days—areas that will require centuries to recover. "Until recently, no one ever thought of wilderness as an irreplaceable, inexhaustible resource. Now we know that the wilderness can be exhausted, and this is most poignantly true of the alpine tundra."

*—Dale W. Jenkins*
Director, Ecology Program
Smithsonian Institution


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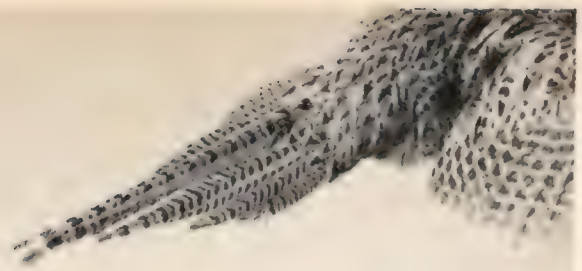

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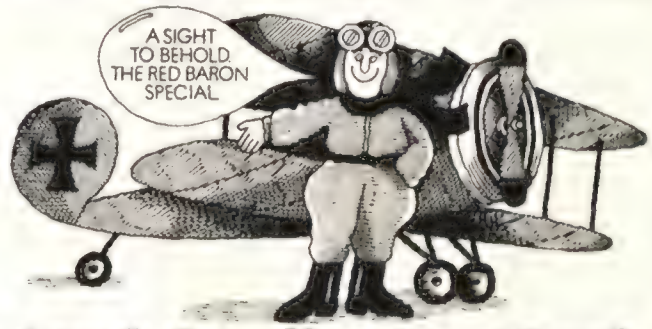


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# *Smithsonian highlights*

*Division of Performing Arts*
For ticket information on the following presentations, call (202) 381-5395.

"Stump Removal," a production of the Otrabanda Experimental Theatre Company, is being performed in the Arts and Industries Building theater at 8:30 P.M. on February 1, 2 and 3.

"Otrabanda Workshop," for actors and interested ticket holders, is an introduction to a series of physical and compositional exercises basic to Otrabanda's technique. February 4, from 8 to 11 P.M.

"Music from Marlboro," the second in a series of chamber concerts, is being performed at 5:30 P.M. on February 3 in Baird Auditorium, Museum of Natural History.

The series of Jazz Heritage Concerts continues with "An Evening of Orchestrated Ragtime," directed by Gunther Schuller, on February 11, 8 P.M., Baird Auditorium, Museum of Natural History.

"Skazki" continues at the puppet theater, Arts and Industries Building. Performances are at 10:30 and 11:30 A.M., Wednesday through Friday, and at 10:30 A.M., 12:30 and 2:30 P.M. Saturday and Sunday.

*National Portrait Gallery*
"New Acquisitions" are on display, including the only known oil painting of F. Scott Fitzgerald.

Note: Regular weekday tours of permanent collections are now being conducted at 11 A.M. and 1 P.M.

*National Collection of Fine Arts*
"From Within," organized by James Harithas of the Everson Museum of Art, Syracuse, N.Y., includes some 50 paintings by inmates of the state maximum security correctional facility at Auburn, N.Y.

"Alfred H. Maurer (1868-1932)" looks retrospectively at an American artist who worked mainly in the figurative tradition but used techniques of the *Fauves* and Post-Impressionists. Opens February 23.

"Drawings and Watercolors of Johann Herman Carmiencke (1810-1867)" are landscape studies made by this German artist on his sketching tours in Europe and North America.

"Sculpture of Hiram Powers" features the marble and plaster sculptures, including *The Greek Slave,* from this 19th-century American artist's Florence studio (see November 1972 SMITHSONIAN).

*Anacostia Neighborhood Museum*
"Biographies Illuminating Black Experiences," in honor of Negro History Week, portrays notable blacks from the past and present. Opens February 12, one week.

*Museum of History and Technology*
"If We're So Good, Why Aren't We Better?" is an encounter with America's pursuit of productivity. The exhibit surveys the history of productivity from the colonial "work-ethic" culture to today's efficiency expert; better-life rewards and problems of waste, unemployment and pollution are illuminated.

**Museum Reference Service**
The Smithsonian Associates have inaugurated a new service known as the Smithsonian Associates' Museum Reference Service. Members traveling within the United States may write for a folder comprised of lists by states of many of our country's museums, galleries and historical sites. Brochures are included when available. Specify the states in which you will be traveling and subjects of interest. Allow three weeks for mailing. Write: Smithsonian Associates' Museum Reference Service, Associates' Reception Center, Smithsonian Institution Building, Washington, D.C. 20560.

*Renwick Gallery*
"Objects for Preparing Food" displays more than 500 utensils, containers and other objects—handcrafted and manufactured, antique and contemporary—that show various processes for the storing, preparation and cooking of food throughout the world. Opens February 9.

*Arts and Industries*
"Air Force Art" is a rotating collection of paintings on activities and personnel.

*Traveling Exhibition Service*
There are up to 70 different Smithsonian-sponsored exhibitions on display each month throughout the United States and Canada. For a complete listing and information on how to bring an exhibit to your area, write: Traveling Exhibition Service, Smithsonian Institution, Washington, D.C. 20560.

- Palm Springs, Calif.—"Marsden Hartley: 99 Drawings" (Palm Springs Desert Museum, Feb. 17-Mar. 18).
- Gorham, Maine—"Graphics '71: West Coast, U.S.A." (University of Maine, Feb. 3-Mar. 4).
- Clinton, N.Y.—"Education of an Architect: A Point of View" (Hamilton College, Feb. 3-Mar. 4).
- Norton, Mass.—"Eskimo Art" (Wheaton College, Feb. 10-Mar. 11).
- Akron, Ohio—"Abstract Design in American Quilts (II)" (The Akron Institute, Feb. 10-Mar. 11).
- Normal, Ala.—"James Weldon Johnson" (Alabama Agricultural & Mechanical University, Feb. 10-Mar. 11).
- Indianapolis, Ind.—"Rock Paintings of Tassili, Sahara" (Martin Center, Feb. 3-Mar. 4).
- New London, N.H.—"Hand of Man on America" (Colby Junior College, Feb. 10-Mar. 11).
- Jamestown, N.Y.—"Just Before the War (I)" (James Prendergast Free Library, Feb. 17-March. 18).
- St. Louis, Mo.—"Swiss Posters" (Washington University, Feb. 3-Mar. 4).

*Smithsonian Commons*
Luncheon facilities for members of the Smithsonian Associates are in the original Smithsonian Building. Open weekdays from 11:30 A.M. to 2 P.M., the Commons offers a buffet luncheon from $1.40 to $1.85 upon presentation of an Associate membership card.

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# *The laugh can be mightier than the tomahawk*

*In their current effort to obtain some redress for the admittedly dirty deal they have suffered from the colonizers of North America, the American Indians may be onto something relatively new. They may be discovering tactics more effective than the doubtful action, reminiscent of white student demonstrations, of occupying and looting the Bureau of Indian Affairs.*

These blows are aimed solidly at the large number of American males who indulge in vicarious violence by spending red-eyed hours looking at television and filling stadiums and field houses. If successful, they could reduce real and synthetic alumni to impotent rage.

But there is a long way to go. These days, to be sure, we recoil at General Phil Sheridan's statement that "the only good Indian is a dead Indian." And his suggestion to the Texas legislature that medals be given buffalo hunters because they were doing more to settle the Indian problem than the Army had done ("let them kill, skin and sell until the buffalo is exterminated") has given way to an attempt to conserve the buffalo still alive. SMITHSONIAN, of course, is all for this and also for saving Indian cultures and helping the Indians themselves. These will be the subjects of future articles.

Back in the Wide World of Sport, a group of Indian students at Stanford has already forced the president to abandon "Indians" as the nickname of the university's athletic team—an "inspiring" victory, according to Wells Twombly of *Sporting News*, even though "the reservations are still impoverished scraps of leftover land." A touch of humor, however, might help the cause as indicated in this Associated Press dispatch:

> Grand Forks, N.D.—Indian students at the University of North Dakota have criticized the school for calling its athletic teams the "Fighting Sioux." So the Indians counterattacked. Now, when they field intramural teams on this campus dominated by Scandinavians, the Indians call themselves the "Fighting Norwegians."

Ridicule could be used against other athletic teams, but a sampling indicates the Indian names are pretty silly anyway. Consider such pro teams as baseball's Cleveland Indians, hockey's Chicago (itself an Indian name) Black Hawks, football's Washington Redskins and Kansas City Chiefs. And the colleges: Coe Kohawks, Florida State Seminoles, the Fighting Illini, Maryland Terrapins (Algonquin for turtle), San Diego State Aztecs, Mississippi College Choctaws, Central Michigan Chippewas, Dickinson State Savages and Huron College Scalpers.

Perhaps these teams hoped they would get a lot of Jim Thorpes (his original name was Wa-Tho-Huck—"Bright Path"; he was 3/8 Potawatomi and 2/8 Sauk and Fox and is still considered America's best all-around athlete). They didn't; so it seems that in the sports world the Indians could well take back their names.

One might think that the problem in North Dakota is simple. Ed Kolpack, sports editor of the *Fargo Forum*, has eliminated team nicknames "really offensive to the Indian people" and reports that "we have received no flak on this policy yet." Also in Grand Forks, to the north, the teams could change back to Nodaks. But wait, Nodak is a contraction of North Dakota and Dakota is a synonym for Sioux. Will the state and others with names derived from Indian languages have to change? We hope not.

On the credit side, the day of making fun of Indians is almost over. It took Lincoln to replace the Indian on the penny.

These days we never think of the stereotype with a vocabulary of "how" and "ugh" enhanced by Tonto's "Kemo Sabay!" But as late as 1947 a singer, Joan McCracken, got laughs in the movie *Good News* with this bouncy refrain:

> *Pass that peace pipe an' bury that hatchet/ Like the Choctaws, Chickasaws, Chattahoochies, Chippewas/And those Chichimecs, Cherokees, Chepultepecs/And those Chicutimees, Chepechets and Chicapees, Chochos, Changos, Chattanoogas, Cheecarows do.* *

Even as a gag the names fall melodiously on the ear, and the American language would be infinitely poorer if the Indians took back all their place names. Read or reread George R. Stewart's *Names on the Land* (Random House) to appreciate the quality of their sound. We wouldn't want to change the name of one of the 17 widely scattered places named after Osceola, a Seminole. And nothing could be more idyllic than Itchepuckesassa, Florida, rendered as "where the moon puts the colors of the rainbow into the earth and the sun draws them out in the flowers."

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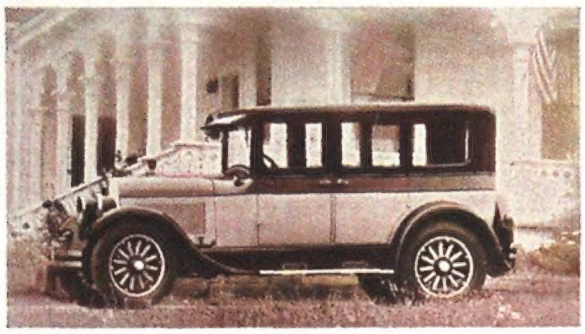

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